NEW OIL POOLS OF KENTUCKY

WILLARD ROUSE JILLSON

The

Kentucky Geological Survey

WILLARD ROUSE JILLSON
DIRECTOR and STATE GEOLOGIST

SERIES SIX
VOLUME TWELVE

New Oil Pools of Kentucky

1926

NICHOLSON BEND, CUMBERLAND RIVER

The Cumberland River swings sharply to the south two miles below Williamsburg, Whitley County, Kentucky, in the Brown's Creek Syncline. (See page 76.)

NEW OIL POOLS *of* KENTUCKY

An Indexed Collection of Twelve Separate Papers On Oil and Gas, Kentucky's Mineral Resources, Progress of Topographic Mapping and Geological Survey Administration in 1922 and 1923.

BY

WILLARD ROUSE JILLSON

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and

CURATOR KENTUCKY STATE MUSEUM

Illustrated with 103 Photographs, Maps and Diagrams

FIRST EDITION 1,500 COPIES

THE KENTUCKY GEOLOGICAL SURVEY

FRANKFORT, KENTUCKY

1926

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Preface

Oil and gas development, including production, reached its peak in the State of Kentucky during the year 1919 with the outline of the Lee, Johnson, Magoffin, Lawrence and Warren County pools. Since that time the history of the industry shows in the main the progressive drilling up of offset locations in these and other districts in the State combined with a persistent attempt in the way of exploration in a number of widely separated localities.

The principal result of this exploration has been the discovery of several new oil and gas pools broadly distributed throughout the State. While none of these pools give indication of a greater importance than that of the Big Sinking Pool in Lee County, they are each and all of them of much economic importance in their respective localities and to the State as a whole.

During the past several years the writer in the course of his official duties has secured, personally, in the field and presents herewith geological and other information pertinent to the most important of these newer oil and gas fields. This volume is, therefore, composed of a group of separate reports distinct in origin and presentation. Most of the field and office work on these manuscripts was done from 1921 to 1923. Delay in printing because of lack of departmental funds made revisions necessary in 1925, thus bringing the volume up-to-date. It is hoped that those interested in the development of oil and gas in Kentucky will find information within these covers of practical benefit in pursuing their separate investigations.

Old State Capitol
Frankfort, Ky.
Dec. 1, 1925.

W. R. Jillson

State Geologist of Kentucky.

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NEW OIL POOLS *of* KENTUCKY

I.

GEOLOGY OF THE PELLVILLE OIL POOL

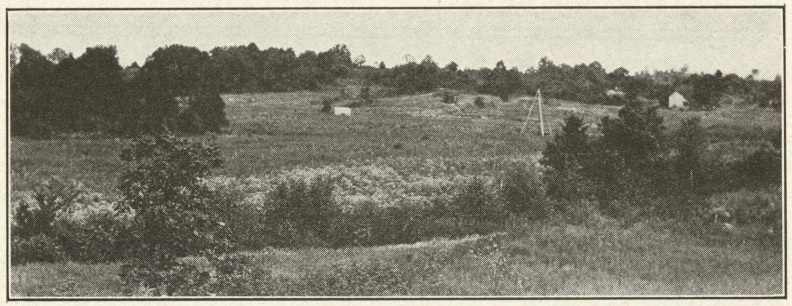
Introduction

The Pellville oil pool is located in Northwestern Kentucky near the Ohio river where Ohio, Daviess and Hancock Counties corner. It is 65 miles southwest of Louisville in an air line and about 19 miles by auto road slightly southeast of Owensboro. Cloverport and Hawesville, small Ohio river towns on the Louisville, Henderson and St. Louis railroad, are respectively 10 and 12 miles northeast of Pellville, while Whitesville, a small town on the Owensboro branch of the Illinois Central railroad, is only about five miles distant to the southwest. The town of Pellville is located on the old Hardinsburg-Owensboro road, which passes through Knoxville and Patesville.

The field work upon which this report is based was done by the writer in the early spring of 1923 and the fall of 1925. Acknowledgment is made of additional field data, including map supplied by J. S. Hudnall, the Petroleum Exploration Co., the New Domain Oil and Gas Co., and the Leeper Oil Co.

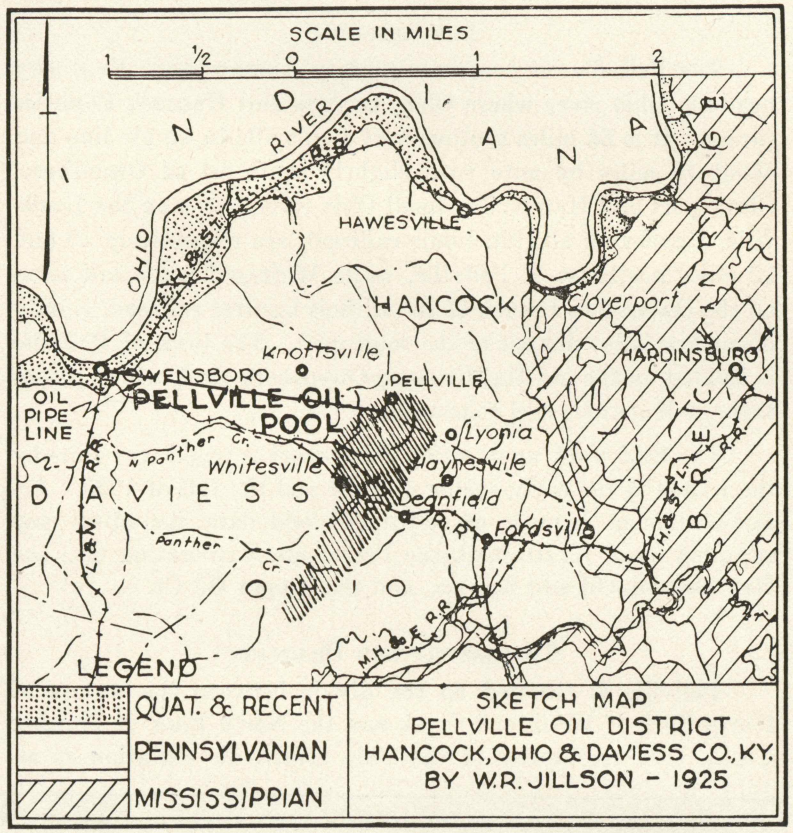
Topography and Drainage

Pellville is situated on the divide between the waters of Horse Fork of Blackford Creek and the North Fork of Panther Creek, both tributaries of the Ohio river. Its elevation as at-



TYPICAL HANCOCK COUNTY TOPOGRAPHY
This view shows the Pyles and Harkles Co. operation on the G. L. Morrison lease with 3 wells pumping about 15 barrels per day.

tested by a U. S. Geological Survey bench mark situated in the town is 531 feet above sea level. The region is one of the low, rolling hills with little level land either in the bottoms or on the ridges. Physiographically it is a part of a very low maturely

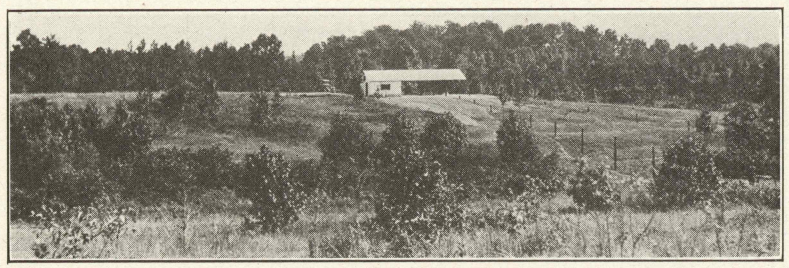


dissected northwest dipping plateau. The highest elevations in the region range up to almost 650 feet near St. Thomas' church, three miles southeast of Pellville in Hancock County. Minimum elevations nearby in Panther Creek and Horse Fork Creek bottoms are about 440 feet. The local relief for any particular part of the field, however, is usually not more than 100 feet.

Stratigraphy—Surface Rocks

Only rocks of the lower coal measures are exposed in the Pellville district. These consist of an alternating series of sand-

stones, sandy shales, shales and coals all of Pottsville (Pennsylvanian) age. The uppermost beds of Chester (Mississippian) age are about 175 or 200 feet below the surface in this vicinity, but may be seen on outcrop in the eastern part of Hancock County. The Hawesville coal described originally by Dr. David



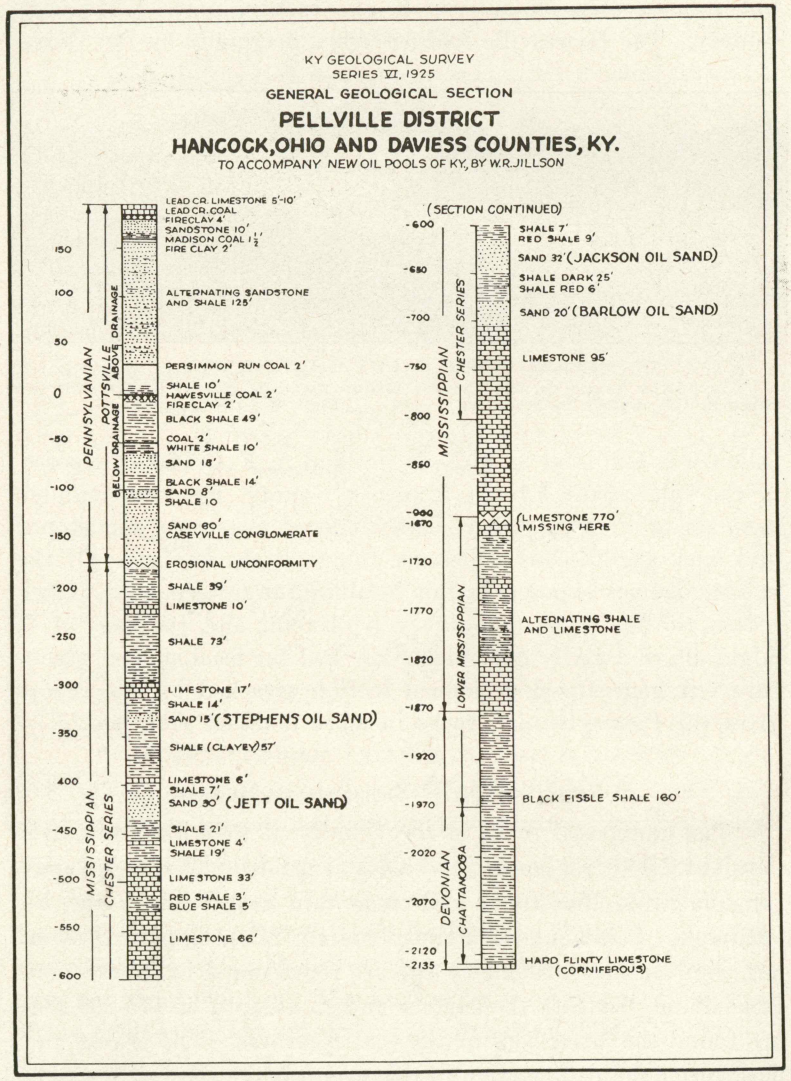
UPLAND TOPOGRAPHY OHIO COUNTY
The power house on the Robert Miller lease is shown located on the ridge in the middle background.

Dale Owen and later by P. N. Moore and A. F. Crider is exposed in the hills about Lyonia, Hancock County, but drops under drainage at Pellville, where superimposed micaceous sandstones and dark argillaceous shales are found at the surface. Of the two sandstones exposed in this locality, the lowermost a rather coarse clastic, seems to be very persistent, and the base of it might afford a fairly dependable key bed for local surface structure. A generalized geological section attached to this report gives the Pennsylvanian rocks in more detailed sequence.

Stratigraphy—Subsurface Beds

The unexposed rocks in the vicinity of Pellville down to a depth of 2,500 feet consist of Paleozoic sandstones, shales, sandy conglomerates, limestones and some thin coals, cannel and bituminous. Sediments of Pennsylvanian, Mississippian, Devonian, Silurian and Ordovician age are represented in this section. Immediately beneath the surface and to a depth of 175-200 feet are found the basal beds of the coal measures. The lowest and most pronounced formation in this group is the Caseyville sandy conglomerate, so well shown on outcrop in eastern Hancock County where it rises as a rather formidable escarpment 50 to 75 feet in height.

Beneath the Caseyville, and separated from it by a pronounced unconformity is found the Chester (upper Mississippian) group of sandstones, sandy shales, shales, and limestones



about 850 feet in thickness. In descending order this group is composed of (1) the Buffalo Wallow shale and limestone, (2) the Tar Springs sandstone, (3) the Glen Dean limestone, (4) the

Hardinsburg sandstone, (5) the Golconda limestone, (6) the Cypress sandstone, (7) the Gasper oolitic limestone, (8) the Sample sandstone, and (9) the Ste. Genevieve limestone. Subjacent to these bed rocks of Meramec (middle Mississippian) age the represented by the St. Louis cherty limestone and the Warsaw formation consisting of shaly limestones and calcareous sandy shales about 450 feet thick. The Osage group (lower Mississippian) is composed of the Rosewood and New Providence shales within which is included several thin sandstones totaling about 400 feet in thickness.

Rocks of Devonian age underlie the Mississippian series unconformably in this section generally at a depth of about 1,850 feet. In this group there are three divisions: (1) The Chattanooga or New Albany shale (upper Devonian), (2) the Hamilton limestone and (3) the Onondaga limestone. The latter two limestones are of Middle Devonian age. The Chattanooga shale is generally about 200 feet thick and the Hamilton and Onondaga limestones underlying are taken together about 50 or 60 feet thick. The Silurian is represented by limestones and calcareous shales of Niagaran age of about 170 feet in thickness beneath which the long Calcareous series of Ordovician beds sets in and continues to undetermined depths.

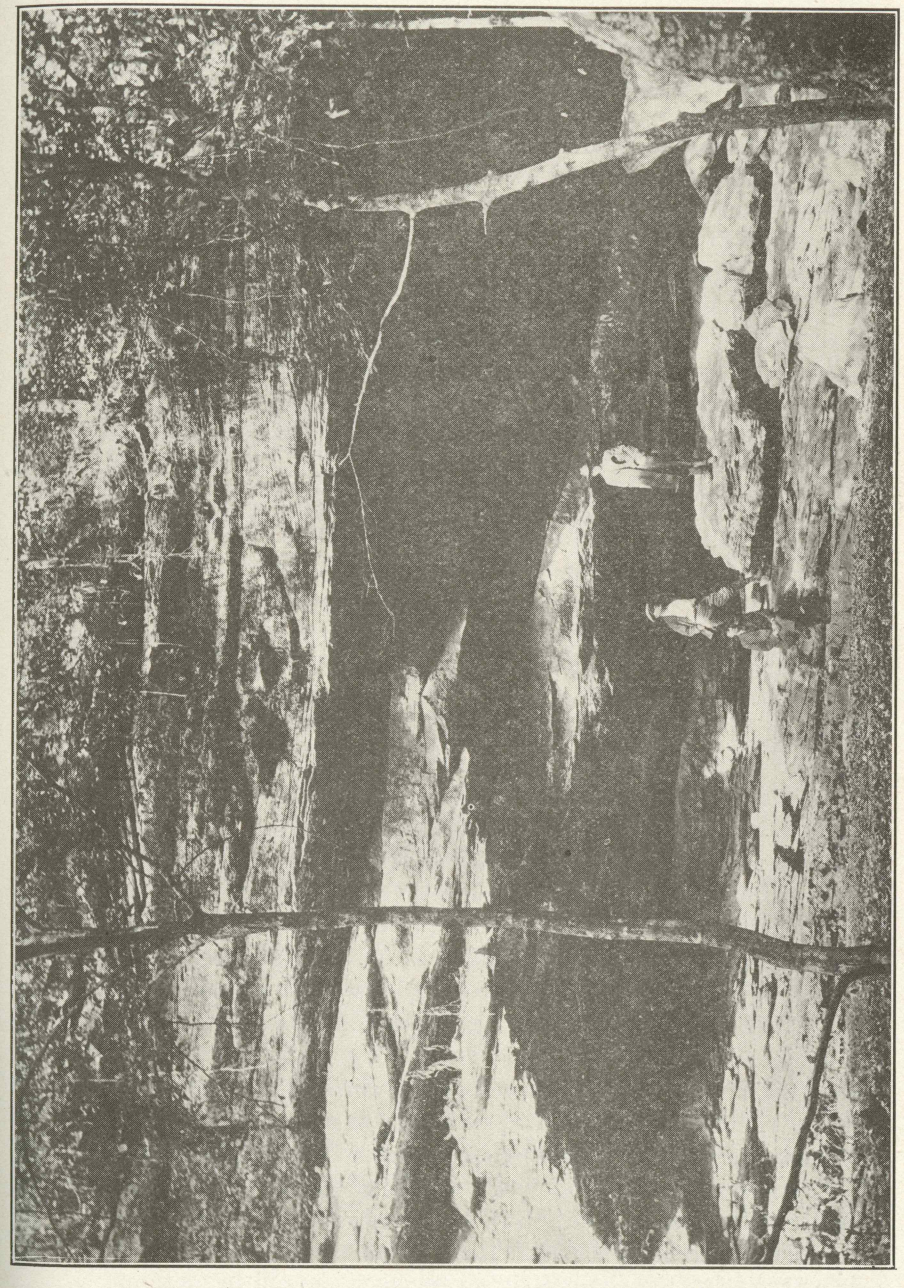
The Trenton exposed on the crest of the Cincinnati Arch in Central Kentucky in the vicinity of Lexington would probably be found in the Pellville region at a depth of about 3,000 feet. The Newman well drilled five miles south of Hawesville to a depth of 2,353 feet did not penetrate it. The deep (3,145 feet) Breckinridge Cannel Coal Co. well drilled at Victoria, in southeastern Hancock County, however, in 1921, was probably completed in the High Bridge series. It possibly entered the Trenton at about 2,850 feet. The record of this well was carefully kept and is regarded as a good guide to the sequence of the deep subsurface formations.

THICKNESSES OF SUB-SURFACE STRATIGRAPHIC DIVISIONS, PELLVILLE DISTRICT, KENTUCKY

System	Series	Formation	Thickness
Pennsylvanian	Pottsville	Caseyville	300–350
Mississippian	Chester	Buffalo Wallow Formation Tar Springs sandstone Glen Dean limestone Hardinsburg sandstone Golconda limestone Cypress sandstone Gasper limestone Sample sandstone Total	850
Mississippian	Meramec	St. Louis limestone Warsaw limestone	450
Mississippian	Osage	Rosewood shale New Providence shale	400
Devonian	Upper	Chattanooga shale	200
	Middle	Hamilton and Onondaga limestone	50
Silurian	Niagaran	Louisville limestone	170
Ordovician	Cincinnatian	Richmond	210
		Maysville	230
		Eden shale	240
	Champlanian	Cynthiana	80
		Lexington (Trenton)	270
		High Bridge	

Oil and Gas Sands

The Pellville oil pool exhibits four separate and distinct oil and gas sands. In order of superposition as penetrated by the drill these sands are known in this district as (1) the "Stephens sand," (2) the "Jett sand," (3) the "Jackson sand," and (4) the "Barlow sand." Although about 350 feet separate the surface from the "Stephens sand," within which is found the entire thickness of the Caseyville conglomerate (Penn-



CYPRESS SANDSTONE ON OUTCROP

This sandstone is massive, cross-bedded, and the lower 20 feet is asphalt impregnated as shown here on the waters of Little Meeting Creek, Grayson County, Ky. It is the "Jackson Sand" of the Pellville district.

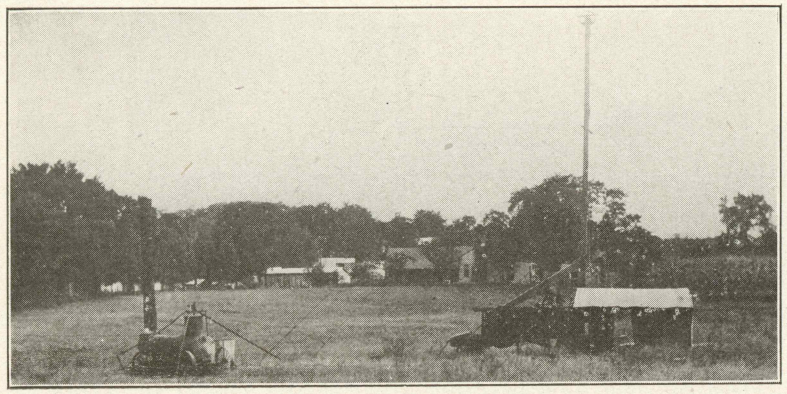
sylvanian) a suitable reservoiring oil sand, this upper division appears to be without production.

The Stephens sand is named from the Stephens No. 1 drilled by the Four States Oil Co. This sand was found at a depth of 443 feet and was drilled into twelve feet. It has been recognized in about one-half of the wells drilled in the field. As indicated in a subsequent correlation table the Stephens sand is a correlative of the Tar Springs sandstone (Chester) and averages about 15 feet in thickness. It is an easily recognizable formation on outcrop in western Breckinridge County, where it has long been known to be bituminous. It should be more generally recognized in well records than it appears to have been.

Beneath the "Stephens sand," the "Jett sand," averaging about 20 feet in thickness is recognized in practically all of the wells. Its thickness ranges from a few feet up to 40 feet, but it has a general average of about 20 feet. This sand is correlated with the Hardinsburg sandstone (Chester) and is one of the most persistent sandstones in the upper Mississippian series. On outcrop it is usually a very massive cross-bedded sandstone, occasionally rippled marked with an inclination to be somewhat shaly in places.

A very prominent oil sand in the subsurface productive section at Pellville is known as the "Jackson," sand and is recognized in practically all wells which are drilled deep enough to penetrate it. It is shown by drillers to be from a few feet up to 47 feet in thickness, and averages about 25 feet—much thinner that the measured outcrop in the vicinity of Big Clifty, Grayson County, where the Cypress sandstone (Big Clifty) was first known. This sandstone is the most prominent siliceous unit in the Chester group. It it decidedly bituminous at many places along its outcrop and is now operated for rock asphalt at Big Clifty (Grayson County), Summit (Hardin County), Garfield (Breckinridge County) and in Logan County, Kentucky. The Cypress sandstone has produced gas in northern Logan County in the vicinity of Diamond Springs. It is an oil and gas sand of commercial importance in both southern Illinois and Indiana.

The lowest sand producing in the Pellville section is known as the "Barlow." The "Barlow" sand, a correlative of the Sample sandstone is a lens in the Chester series, and, while not as extensive as the Cypress, it covers, as evidenced by examination of numerous well records in this and adjacent parts of Kentucky, a considerable area and should receive careful consideration in all drillings projected to depths greater than the Cypress. On outcrop in Breckinridge County, it is found to

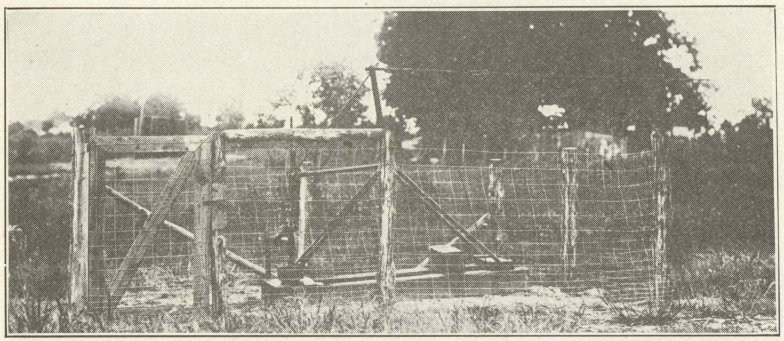


A HANCOCK COUNTY DRILLING
This operation of the Illinois Oil Co. is on the Bell Asher lease at Pellville, Kentucky. Characteristic topography is shown.

be 35 feet in thickness, but these thicknesses are not recognized in the drillings in the Pellville district, where an average of those wells which have penetrated to this sand shows it to be but 14 feet in thickness. Evidently this sand is thinning rapidly in this locality as it proceeds to the west. Since this sand occurs between the two well defined beds of limestone its measurements in the drilling records should be fairly accurate.

A review of the above correlations indicates that the "Barlow" sand is the deepest proven shallow sand in this field. After it has been penetrated no other sands of possible commercial importance from an oil and gas producing standpoint may be expected until the siliceous limestones of the Keokuk and Fort Payne formations are encountered. Since no commercial production is known to occur in this field in these lower Mississippian formations, little importance is now attached to them, though at Cloverport Keokuk beds produced gas at a depth of about 870 feet. The Chattanooga (Devonian) black shale is productive of gas at Rockport and Brandenburg in Meade County, but is not considered important here. It is underlain by the Corniferous (middle Devonian). This well known Ken-

tucky oil and gas producing horizon was found in the Jackson No. 2 well at a depth of 2,140 feet. Its extreme depth here prompts the suggestion that it will probably not be of commercial importance in this section, as the Corniferous is not known



PUMPER ON ROBERT MILLER LEASE

This well near a county school is fenced in accordance with a State law. It produced about 12 barrels a day from two sands, the "Jett" at 500 feet and the "Barlow" at 750 feet.

to be productive of oil in commercial quantities at such depths anywhere in this state. The Corniferous was productive, however, at shallower depths in central Ohio county in the Hartford pool. The known shallow productive oil and gas sands of the Pellville district are correlated as follows; the Barlow being regarded as the best at the present time.

CORRELATIONS OF PROVEN OIL AND GAS SANDS, PELLVILLE DISTRICT

(In order of superposition)

Oil Sand	Av. Thickness		Stratigraphic Name
1. "Stephens" sand	15 feet	CHESTER	Tar Springs Sandstone
2. "Jett" sand	20 feet	CHESTER	Hardinsburg Sandstone
3. "Jackson" sand	25 feet	CHESTER	Cypress Sandstone
4. "Barlow" sand	14 feet	CHESTER	Sample Sandstone

A number of records of wells drilled in the Pellville district have been examined by J. S. Hudnall, who has selected 17 as representative of the best records now available in the field. These have been compiled into a table to show the depths at which several sands have been encountered. This tabulation, followed by a few selected well logs, is presented herewith:

TABULATION OF OIL AND GAS RECORDS, PELLVILLE OIL DISTRICT, KENTUCKY

Name of Well	Elev.	Total Depth	Remarks	Stephens No. 1 (Tar Spring)	Jett No. 2 (Hardinsburg)	Jackson No. 3 (Cypress)	Barlow No. 4 (Sample)
Higdon	465	771	Good log		499–501	711–706	759–771 Oil
Stephens	568	455	Poor and inaccurate log	443–455 Oil			
Garrett	488	707	Good log		430–450 Oil	630–662	688–707
Stewart No. 1 by Gibson	537	482	Good log	370–424 Gas	Oil and Gas 442–482		
Stewart No. 1, Ky. Oil Co.	542	686	Good log	371–380 Oil and gas	Oil and gas 456–480	670–686 (Saltwater) (686)	
Stewart No. 2 Ky. Oil Co.	524	469	Good log	Show of oil and gas 360–363	Oil 433–467		
Stewart No. 3 Ky. Oil Co.	528	482½	Good log	360–380 Gas	Oil 441–482		
Barker	540?		Being drilled				
Jett No. 1	560	483	Fair log		464–483 Oil and gas		

TABULATION OF OIL AND GAS RECORDS, PELLVILLE OIL DISTRICT, KENTUCKY—Continued.

Name of Well	Elev.	Total Depth	Remarks	Stephens No. 1 (Tar Spring)	Jett No. 2 (Hardinsburg)	Jackson No. 3 (Cypress)	Barlow No. 4 (Sample)
Jett No. 2	557	770	Good log	382–386 Gas	Show of oil 470–480	Gas and show of oil 666–685	730–740 Show of oil
Barlow No. 1	547	748	Fair log			667–687? Oil	726–748 Oil
Rowland No. 1	525	713	Good log	393–401 Gas	438–458	(Saltwater) 639–665	696–710 Oil
Jackson No. 1	462	619	Poor log		387–395	607–619 Oil	
Jackson No. 2	462	2405	Fair log		Show of oil 385–392	607–619 Oil	Saltwater 680–690
Arrington	510	726	Good log	375	447–451	584–631 Gas	Saltwater 726 661–670
Ray No. 1	550?	548	Depth to sand approximate		364–378	Saltwater 540 527–548 gas	
Tally No. 1	490?	502			310–320	467–502 (Oil and gas) Saltwater at 502	

ANALYSES.

G—4164. Petroleum labeled "Pat Stevens' farm in Hancock Co., near Pellville." Wells 5, 6, 7, 8, 9, 10. Wells from 500 to 700 ft. deep. Drilled by Bert Thomson, Pellville, Ky,. in 1924. Collected by W. H. Lambeth.

Samples received July 5, 1924. A thin, dark brown oil. Specific gravity 0.8445, at 60 F, or 35.8 Beaume.

Analysis

Distillate below 150°C (302°F)	18.9%	Gasoline fraction
Distillate 150-300°C (302-572°F)	31.0%	Burning oil fraction
Thick, brown tar	49.7%	
Loss in analysis	0.4%	
	100.0	

Began to distil at 60°C (140°F)
(Analysis by A. M. Peter)
July 7, 1924.

A. M. Peter, Chief Chemist.

G—4165. Petroleum labeled "Oil" found on W. L. Ashland's farm, John Brown's farm, Pellville, Ky.

Wells are between 500 and 700 ft. deep. From wells 1, 2 and 3. Drilled in 1924, by Bert Thompson, contractor, Pellville, Ky."

Sample a thick, dark brown oil. Specific gravity .8748, or 30° Beaume.

Volume per cent

Distillate below 150°C (302°F)	8.1	Gasoline fraction
Distillate 150 to 300°C (302-572°F)	33.1	Burning oil fraction
Thick brown tar	58.8	
	100.0	

Began to distil at 100°C (212°F)
A little water present.
Analysis by A. M. Peter.
July 14, 1924.

A. M. Peter, Chief Chemist.

Analysis.

G—4166. Petroleum labeled "W. G. Payne, Syh. Johnson, the Stewart heirs, farm near Reynolds Station, Ky. Wells from 500 to 700 ft. deep. Drilled by the Ky. Oil Co., Pellville, Ky. Wells Nos. 21, 22, 23, 24, 25, 26, 27, 28 and 29.

Sample a thick, dark brown oil. Specific gravity .8715, or 30.6° Beaume.

Analysis.

Distillate below 150°C (302°F)	9.1	Gasoline fraction
Distillate 150 to 300°C (302-572°F)	36.3	Burning oil fraction
Thick, brown tar	54.6	
	100.0	

Began to drill at 100°C (212°F)
A little water in the sample.
Analysis by A. M. Peter.
July 14, 1924.

A. M. Peter, Chief Chemist.

Well Records

OHIO COUNTY

LOG No. 1.

T. E. McQuarry No. 1, lessor. Texas and Kentucky Oil Company, lessee. Location 1 mile east of Bells Run, Ohio County, Kentucky. Authority: Hillis and Shoptaugh, driller.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	10	10
Sandstone	10	20
Shale, sandy	100	120
Clay, sandy, soft, black	75	195
Shale, blue (cave)	65	255
Limestone, blue	5	260
Shale, blue, muddy	20	280
Sandstone (water)	5	285
Shale, blue	15	300
Sandstone, coarse	5	305
Sandstone, water	25	330
Shale brown	5	335
MISSISSIPPIAN SYSTEM		
Limestone broken	10	345
Limestone grey	25	370
Shale	30	400
Shale, soft, blue	80	480
Limestone, broken	15	495
Shale, soft, light	10	510
Shale, blue (cave)	140	650
Limestone white	10	660
Limestone grey	60	720
Shale, soft	55	775
Limestone	40	815
Shale	25	840
Sandy shale	5	845

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sandstone (Jackson oil sand dry)	25	870
Shale	10	880
Limestone	10	890
Shale	5	895
Limestone	2	897
Sandstone (Barlow sand oil show)		906
Shale blue	10	916
Limestone	2	918
Limestone, sandy	32	950
Shale	8	958
Limestone	28	986
Shale (cave)	22	1008
Limestone, white	42	1050
Total depth		1050

HANCOCK COUNTY

Production: Oil and gas. Producing sands: "Pelville" and "Tar Springs" (Chester-Mississippian).

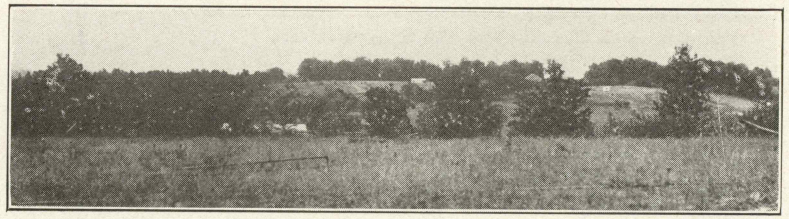
LOG No. 2.

Breckinridge Cannel Coal Co., England, owner and operator. Location: Victoria post office. Drilled in spring of 1921. Driller, Albert MacGarvey. Stratigraphic interpretation of Prof. Arthur M. Miller, Lexington, Ky. Casing head, 550 feet, A. T. Standard rig. Casing head strata: Top of Chester.

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Surface materials	14	14
Shale, light colored (Buffalo Wallow)	5	19
Limestone, white (Buffalo Wallow)	6	25
Shale, gray (Buffalo Wallow)	8	33
Limestone, gray (Buffalo Wallow)	4	37
Shale, gray (Buffalo Wallow)	13	50
Limestone, white to gray (Buffalo Wallow)	32	82
Shale, mainly, light to dark (Buffalo Wallow)	38	120
Sandstone and dark shale (Tar Springs)	23	143
Limestone, dark (Glen Dean)	1	144
Shale, calcareous (Glen Dean)	14	158
Limestone, dark (Glen Dean)	4	162
Shale, dark gray (Glen Dean)	1	163
Limestone, dark gray (Glen Dean)	5	168
Shale, dark gray (Glen Dean)	29	197

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Limestone, dark crystalline (Glen Dean)	3	200
Shale, dark (Glen Dean)	2	202
Limestone, dark, crystalline (Glen Dean)	15	217
Sandstone and shale (Hardingsburg)	11	228
Limestone, dark to light (Golconda)	37	265
Shale (Golconda)	19	284
Limestone, white to gray (Golconda)	52	336
Shale, dark to light (Golconda)	22	358
Limestone, slaty (Golconda)	12	370
Sandstone with shale (Cypress)	62	432
Limestone (Gasper)	24	456
Sandstone, white (Gasper)	13	469
Limestone, white to dark (Gasper)	231	700
Limestone, oolitic, white (show oil), St. Gen	170	870
Limestone, varying in color, and of varying degrees of purity (St. Louis, Warsaw and Upper Waverly)	820	1690
Shale, greenish (New Providence)	30	1720
DEVONIAN SYSTEM		
Strata	Thickness	Depth
Shale, black (Ohio-Chattanooga)	198	1918
Limestone, white	52	1970
SILURIAN SYSTEM		
Limestone, yellow to white	170	2140
ORDOVICIAN SYSTEM		
Limestone, of varying colors and textures at bottom, compact like High Bridge limestone	1005	3145
Total depth	8	3145

Oil Field Stratigraphy of Kentucky, Willard Rouse Jillson, the Kentucky Geological Survey, Series VI, Vol. 3, pages 189, 190, 1922.



C. M. SCHULTZ LEASE, HANCOCK COUNTY
The nature of the topography, low flat hills with rather shallow drainage lines, has favored the development of the Pellville district for oil and gas.

HANCOCK COUNTY

WELL LOG No. 3.

Barlow No. 1, lessor. Bert Thompson, lessee. Location: ½ mile southeast of Pellville, Hancock County, Ky. Type of Rig: National. Method of Drilling: cable. Kind of fuel used: Coal. Packers: Size 6¼. Set at 619. C. H. E 547 feet

PENNSYLVANIAN SYSTEM		
Strata	Thickness	Depth
Soil, sandstone and shale	452	452
MISSISSIPPIAN SYSTEM		
Limestone	6	458
Shale	4	462
Sandstone	1	463
Shale, black	137	600
Limestone, brown	10	610
Limestone, gray and brown	47	657
Shale	5	662
Limestone, sandy	5	667
Shale, sandy	11	678
Sandstone	48	726*
Sandstone (Barlow)	17	743**
Sandstone	5	748
Total depth		748 feet

*Top of pay
**Bottom of pay.

Case Record: 20′ 10″,—260′ 8¼″,—619′ 6¼″. Torpedo Record: East. Torp. 60 qts. 15 ft. shell 5½ size. Commenced Producing: Mar. 12, 1922. L. P. Per 24 hrs. 32 bbls.

LOG No. 4.

Amanda Stewart No. 1 (55 A tract), lessor. H. F. Gibson, lessee. Near line of Hancock and Ohio counties. (In Hancock County.) Well completed June 6, 1922.

Strata	Thickness	Depth
PENNSLYVANIAN SYSTEM		
Surface soil	0	10
Sandstone	10	32
Shale	32	64
Sandstone, white	64	75
Sandstone	75	105
Shale	105	150
Sandstone	150	180
Shale and Pyrites	180	186
Sandstone	186	208

Strata		Thickness	Depth
MISSISSIPPIAN SYSTEM			
Shale		208	275
Sandstone		275	295
Shale		295	310
Limestone (sulphur)		310	315
Limestone, gray		315	350
Sandstone ("Stephens") gas, Tar Springs		350	424
Limestone, gray		424	430
Shale		430	442
Sandstone, hard	Hardinsburg	442	452
Sandstone (gas)	Hardinsburg	452	460
Sandstone, hard	Hardinsburg	460	462
Sandstone, oil ("Jett")	Hardinsburg	462	485
Total depth			485

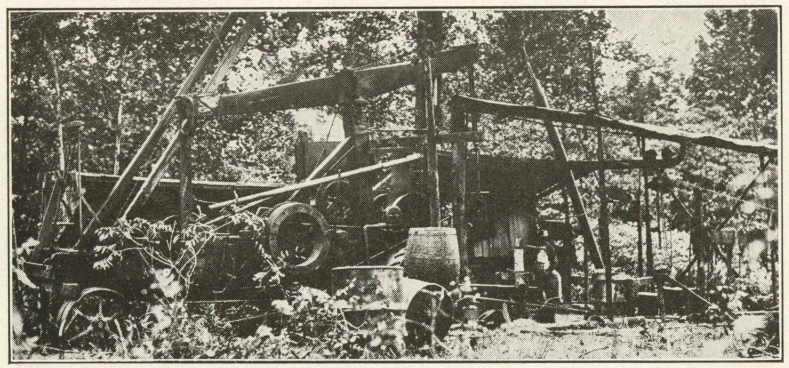
Note on Production: Natural gas measured 48,600 cu. ft. and was increased by a shot. Well filled up 200 feet at time of this shot, rising 40 feet in fifteen minutes. Estimated 5 barrels, gravity 29½ degrees Baume. Color, black. Gasoline rig used.

LOG No. 5.

Morrison No. 1 (30a), Daugherty & Shearer. Hancock County, adjoining farm to Barlow farm where first Barlow sand was found.

Elevation 502.

Jett sand	absent
Top of "Jackson" sand	623 to 653
Top of "Barlow" sand	689 to 712 (oil)
Total depth	712



AN OHIO COUNTY DRILLING

Portable rigs are used entirely in the Pellville district due to the shallow depth of the producing sands and the ease with which such rigs can be moved to new locations.

LOG No. 6.

Higdon No. 1, drilled by E. M. Treat. Daviess County, about 4 miles west of Pellville.

Top of "Jett" sand	499–501
Top of "Jackson" sand	711–716 (oil)
Shale	716–718
Sandstone	718–724
Top of "Barlow" sand	758–770 (water)
Total depth	770

OIL WELL "SAND" RECORDS

OHIO, HANCOCK AND DAVIESS COUNTIES, KENTUCKY

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
Stewart No. 3	457	467	482
A. Stewart No. 1	462	483	492
Rowland No. 1	687	711	713
Higdon No. 1	709	766	766
Garrett No. 1	693	703	711
Garrett No. 1	438	443	711
Morrison No. 1	689	707	715
A. Stewart No. 4	442	448	452
Ira Jett No. 1	445	457	463
Jones No. 1	615	624	685
A. Stewart No. 5	712	727	725
Ira Jett No. 2	451		462
Barlow No. 2			713
Stewart No. 1	465	478	487
Hoover No. 1	680	700	705
Voyles No. 1	721	741	745
Higdon No. 1	772	779	784
Higdon No. 1	714	726	784
Shultz No. 1	668	684	688
Garrett No. 1			
Hoover No. 2	674	690	690
Ira Jett No. 2	700	716	719
Shultz No. 8	665	679	683
Hoover No. 3	708	722	732
Garrett No. 1	724	726	727
M. Brayer No. 1	817	825	825
A. Stewart No. 2	468	478	502
Barlow No. 3	700	713	730
Shultz No. 3	674	686	698
A. Stewart No. 3	458	480	486

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
A. Stewart No. 4	436	457	478
Morrison No. 2	664	686	686
C. Jett No. 1	466	476	484
Shultz No. 4	667	681	681
Rowland No. 2	725	737	739
C. T. Johnston No. 1	488	504	516
A. Stewart No. 6	450	482	494
C. Jett No 3	467	479	481
A Stewart No. 5	422	450	470
Rowland No. 3	467	476	499
Barlow No. 4	721	735	747
A. Stewart No. 7	463	490	503
A. Stewart No. 6	416	457	464
Rowland No. 3	718	728	741
D. King No. 1	890	915	915
A Stewart No. 8	439	459	469
A. Stewart No. 9	438	467	484
L. Payne No. 1	443	499	499
Stewart No. 1			
Rowland No. 4	731	741	745
Johnson No. 3	604	615	
A. Stewart No. 10	730	750	755
R. M. Miller No. 1	707	723	736
L. Helm No. 1	464	484	494
L. C. Voyles No. 2	267	296	703
Wm. Payne No. 1	733	747	757
Smith No 1	784	799	815
Morrison No. 3	671	697	699
R. M. Miller No. 2	426	448	473
C. T. Johnson No. 8	429	453	469
Holoman No. 5	469	495	500
C. A. Leeper No. 1	720	734	760
R Miller No. 8	686	711	726
V. Miller No. 1			
Brown No. 1	549	562	565
C. T. Johnson No. 3	700	718	718
Helm No. 2	417	436	460
Baize No. 2	668	691	702
R. Miller No. 3	676	698	705
V. Miller No. 2	728	746	754
Burdette No. 1	749	763	775
Bailey No. 1	399	437	457
Chambers No. 1	675	690	705
Baize No. 2	720	737	744

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
A. Howe No. 1	715	730	740
A. Stewart No. 7	404	430	466
R. Miller No. 4	715	740	740
A. Howe No. 1	676	694	704
V. Miller No. 3	450	469	550
V. Miller No. 3	715	734	745
O. Bickett	674	690	690
S. Flowers No. 1	720	740	749
A. Stewart No. 8	720	739	759
A. Stewart No. 4	723	742	754
A. Howe No. 2	665	681	692
V. Miller No. 5	691	713	714
R. Miller No. 5	706	726	726
A. Stewart No. 11	407	431	438
Reardon No. 1	709	726	726
A. Stewart No. 9	463	497	506
J. Brown No. 2	534	547	802
W. Howe No. 3	696	712	712
A. Stewart No. 9	456	487	489
Burdette No. 2	734	747	762
H. School No. 1	717	730	735
Casey No. 1	461	491	492
A. Howe No. 2	699	714	720
A. Howe No. 4	684	700	700
Smith No. 2	726	741	756
Bud Barker No. 1	760	776	776
A. Stewart No. 13	711	730	735
J. S. Casey No. 2	430	460	467
Reardon No. 3	684	702	711
V. Miller No. 6			
A. Howe No. 3	695	710	710
A. Stewart No. 14	693	713	724
Barker No. 2	733	747	747
Jett No. 2	727	738	741
Reardon No. 4	762	780	780
Payne No. 2	702	713	725
A. Howe No. 4	718	735	735
Miller No. 6	460	481	497
V. Miller No. 7	668	680	690
O'Neil No. 1	774	790	790
Daugherty No. 1	694	714	720
W. Payne No. 3	701	712	726
H. Brown No. 1	718	748	748
V. Miller No 8	418	440	440

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
Ed Barker No. 2	747	760	762
Daugherty No. 2	684	702	702
V. Miller No. 8	689	711	723
A. Howe No. 5	721	734	748
Bud Barker No. 2	744	756	756
V. Miller No. 7	730	744	755
Daugherty No. 3	714	733	743
D. King No. 2	615	622	976
Garrett No. 1	444	458	476
A. Payne No. 1	736	750	761
Collier No. 1	422	437	448
A. Stewart No. 15	703	721	731
Bailey No. 2	420	439	449
Thompson No. 1	697	723	730
G. Burdette No. 1	407	426	426
R. Miller No. 9	718	730	738
S. Flowers No. 2	676	698	707
Helm No. 4	457	487	487
Collier No. 2	506	515	700
A. Stewart No. 14	403	438	443
Gus Haynes No. 1	785	800	802
E. Ward No. 1	978	1008	1008
R. Miller No. 10	729	744	760
J. Brown No. 3	510	524	531
Guenther-Gant No. 1	507	510	780
R. Miller No. 11	739	748	758
Swope No. 1	790	804	812
Bartley No. 1	377	502	510
Casey No. 4	432	461	465
Bartley No. 1	487	502	502
R. Miller No. 1	680	706	706
Casey No. 6	393	439	446
Evans No. 1	524	534	537
W. T. Bickett No. 1	376	420	430
A. Stewart No. 16	660	678	689
Bartley No. 2	400	410	410
L. E. Crowe No. 1	753	771	772
L. E. Crowe No. 2	763	777	777
R. Miller No. 12	743	762	765
Beauchamp No. 1	487	501	510
L. E. Crowe No. 3	490	504	510
Smith No. 4	763	781	800
J. L. Brown No. 5	528	542	542
Bartley No. 4			

Names	Top Sand Feet	Bottom Sand Feet	Depth Well Feet
Phillips No. 1	769	781	790
Evans No. 5	520	539	539
Powers No. 1	766	795	801
Collier No. 2	492	501	511
Phillip No. 2	603	619	620
R. Miller No. 13	698	719	730
Crowe No. 4	765	780	788
A. Stewart No. 17	657	672	681
V. Miller No. 9	665	683	686
Barlow No. 5	690	710	730
Phillips No. 2	781	784	784
Casey No. 7	455	484	497
Smith No. 5	734	750	766

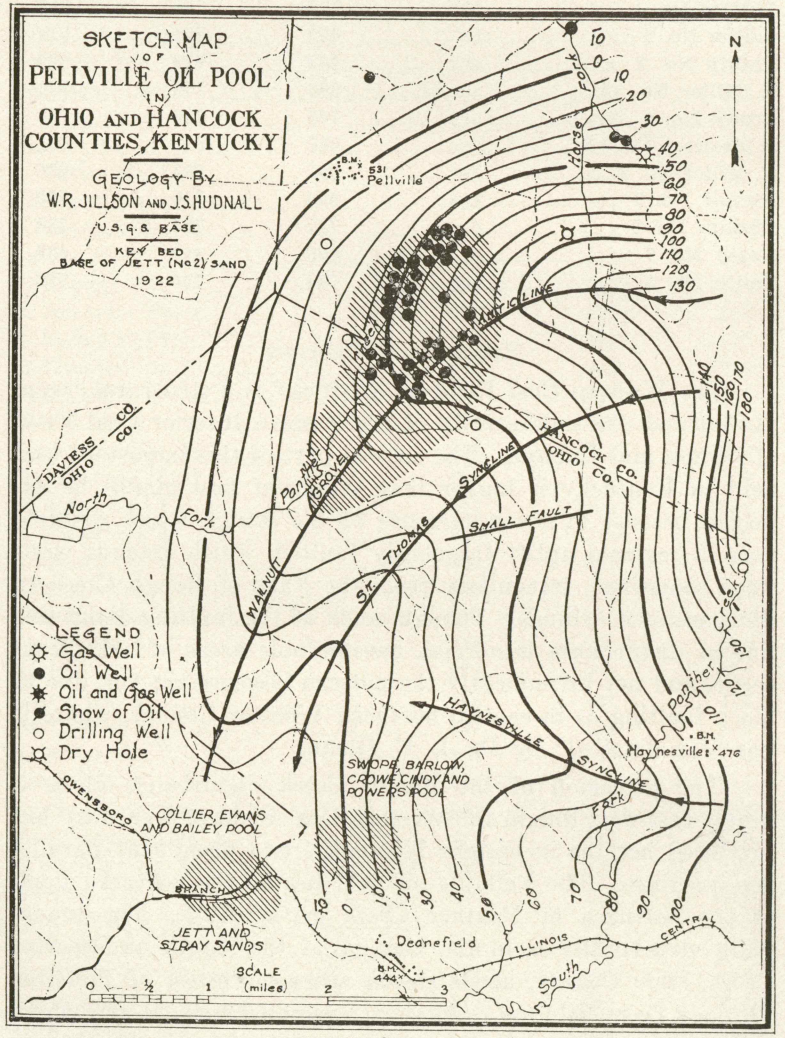
Structural Geology

The Western Coal Field of Kentucky is a structural basin. It is in fact the southern tip of the Eastern Interior Coal Field of Illinois and Indiana. The central part of this important coal field in Kentucky is higher than might at first glance be expected because of the occurrence of the Rough Creek disturbance, a regional uplift frequently faulted, which extends westward somewhat irregularly from the Falls of Rough Creek to Shawneetown, Illinois. Though much of the faulting along this line of disturbance is normal, considerable areas of overthrust occur, and not infrequently the pattern becomes zig-zag, due to block faulting as in central northern Webster County, where it has been detailed* by Dr. L. C. Glenn.

The extension of the Rough Creek disturbance along a nearly east-west line in the Western Coal Field of Kentucky has produced here as in eastern Kentucky, two prominent parallel geo-synclines. The Pellville oil pool lies on the northern flank of the northern or Panther Creek geo-syncline. The lowest point structurally is in the vicinity of the mouth of Deserter Creek, Ohio County, about eleven miles southwest of Pellville. Through Deanefield the rocks show a regional strike nearly north and south to north flank of the Rough Creek disturbance, which passes through the vicinity of Dundee in Ohio County, a

*Geology of Webster County (and geological map), Ky. Geol. Survey, Series VI., Vol. V, p. 129, 1922.

point about 14 miles slightly southeast of Pellville. The relative position of the major structural features of this region with respect to the Pellville oil district may be seen in the accompanying sketch map of Hancock and Daviess Counties.



Surface rocks dip nearly due west from the vicinity of Lyonia at the rate of about 40 feet per mile. In the vicinity of Pellville the line of strike has turned almost 90 degrees clockwise, and the dip is slightly west of due north, at the rate of about 30 feet per mile. It is anticipated that the subsurface dip in any of the Chester sands will be a little greater than that seen at the surface due to the thickening of the Pottsville sandstones in a westerly direction. Levels run on the Hawesville coal coupled with elevations placed on the Jett sand by Mr. Hudnall, reveal a well defined though low fold plunging to the southwest from the Jett wells towards Old Panther church and Walnut Grove school. The axis of this structure—the Walnut Grove anticline flexes to the east north of the Ohio-Hancock County line as a glance at the structural map will verify. It has an axial plunge of about 15 feet to the mile. The downfold to the east into the St. Thomas syncline is small, being in many places less than 15 feet. The dip on the west or normal side of this anticline is greater, ranging between 30 and 35 feet per mile.

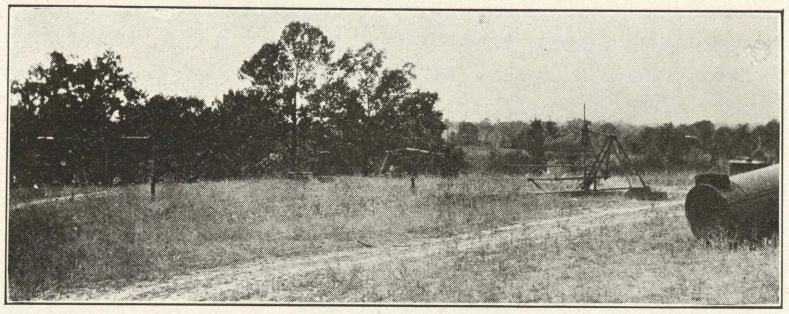
Only one fault, and it a small one, was observed in this region. This break strikes slightly south of west and has a displacement of about 20 feet. It may be seen in the road about one-half mile west of Sourwood schoolhouse in Ohio County, near the Hancock County line. This fault is apparently local and has little, if any, influence upon the Pellville oil field.

Other faulting in the Pellville district is unknown, though in the northern part of Hancock County a considerable disturbance has been noted just south of Hawesville, on the Hartford road in Lead Creek. This break is in the nature of normal block faulting with displacement of about 75 or 80 feet. The downthrow is on the northwest. Rocks in the fault plane are inclined as much as 70 or 75 degrees from the horizontal. On the structural map accompanying this report many of the wells now producing or dry in the Pellville field have been plotted, indicating very definitely the nature of the oil trend and its close relationship to the geologic structure of the region.

Development and Production

The Pellville oil pool was opened by the Newman Oil Co., who drilled into production on the Jackson lease in 1920. Crude oil was found in this well in small quantities in the Cypress sandstone—"Jackson" sand—at a depth of 607 feet. Following the drilling in of this well others were brought in rather rapidly dur-

ing the next two years until about 20 wells were completed in this district with only two or three failures. Dry holes or "show" wells were completed on the Arrington, Brown, Ray, Tally and some additional "off structure" leases. The Sanders, Barlow, Stewart and some several other leases have produced



AN OHIO COUNTY LEASE

This view shows a portion of the Damer and Miller Co. property with three pumps and 2 tanks. Characteristic topography of the uplands in this part of Ohio County, Ky.

small amounts of natural gas, but the total volume of gas produced in this pool has been of small consequence. Production has been extended southwestward to within one mile of Mount Moriah church in Ohio County. In one locality there are not less than 70 or 75 producing wells in a circle one mile in circumference.

Most of the productive oil wells in the Pellville pool range from 2 to 25 barrels, with an average of 7 to 10 barrels per day. Salt water has been encountered in a large number of "down the dip" or "off structure" leases. Included among these are the Higdon, Stewart, Ray, Tally, Arrington, and others. Up to the present it is estimated that about 300 wells have been drilled in the Pellville oil pool, and are now productive of about 5 to 7 barrels per day. Considerable development activity is still in evidence as indicated by the fact that there are now about 20 rigs drilling in this field. Complete statistics of production, based upon actual pipe line runs, are as follows:

PETROLEUM PRODUCTION
PELLVILLE DISTRICT, KENTUCKY

HANCOCK COUNTY OIL PRODUCTION
Indian Refining Co.

1922	Bbls.	Value
October	644.06	$1,101.34
November	1,327.81	2,270.56
December	652.71	1,130.75
Total	2,624.58	$4,502.65

1923	Bbls.	Value
January	673.40	$1,386.60
February	771.17	1.967.10
March	2,267.53	5,918.75
April	2,381.17	5,618.61
May	3,247.82	6,119.54
June	3,355.25	5,741.50
July	3,380.04	5,073.44
August	3,387.52	4,945.78
September	2,783.11	3,898.02
October	2,987.23	3,913.27
November	3,155.83	3,923.11
December	3,008.00	3,872.86
Total	31,398.07	$52,378.58

1924. Ind Pipe L. Corp.	Bbls.	Value
January	1,930.62	$3,433.41
February	3,222.44	7,121.59
March	4,159.04	9,610.09
April	3,470.67	8,171.00
May	3,266.38	6,861.03
June	2,976.54	5,325.03
July	2,983.80	4,659.80
August	2,796.56	3,685.59
September	2,874.25	3,453.99
October	3,218.00	3,526.61
November	3,174.12	3,740.38
December	2,584.49	3.101.37
Total	36,656.91	$62,689.89

1925	Bbls.	Value
January	2,983.19	$3,777.64
February	2,384.77	4,308.33

1925	Bbls.	Value
March	3,196.78	6,231.48
April	3,078.48	5,978.41
May	2,773.07	5,407.49
June	2,503.15	4,853.36
July	2,871.60	5,774.50
August	2,792.96	5,630.33
September	3,402.00	6,079.00
	25,896.00	$48,040.54

TOTAL OIL RUNS HANCOCK COUNTY, KENTUCKY
(Oct., 1922–Sept., 1925, inclusive.)

	Bbls.	Value
1922	2,624.58	$4,502.65
1923	31,398.07	52,378.58
1924	36,656.91	62,689.89
1925	25,896.00	48,040.54
	96,575.56	$167,611.66

OHIO COUNTY OIL PRODUCTION

1922	Bbls.	Value
October	612.15	$1,046.78
November	396.38	677.81
December	257.08	445.37
Total for 3 months	1,265.61	$2,169.96

1923	Bbls.	Value
January	161.71	$332.98
February	85.35	217.71
March	166.62	434.88
April	240.64	567.81
May	411.61	775.56
June	648.82	1,110.26
July	810.01	1,215.83
August	894.62	1,306.14
September	720.21	1,008.73
October	1,253.36	1,641.90
November	2,140.85	2,661.35
December	2,255.41	2,903.89
Total	9,789.21	$14,177.04

1924	Bbls.	Value
January	1,235.85	$2,197.84
February	3,062.97	6,769.16

1924	Bbls.	Value
March	4,299.77	9,935.26
April	4,684.12	11,027.82
May	7,524.32	15,804.83
June	7,041.18	12,596.67
July	8,614.78	13,453.70
August	8,240.16	10,859.71
September	8,751.27	10,516.40
October	9,550.78	10,466.70
November	7,942.27	9,339.17
December	7,683.85	9,187.80
Total	78,631.32	$122,175.06

1925	Bbls.	Value
January	8,259.67	$10,510.43
February	8,560.22	15,612.99
March	9,517.75	18,394.00
April	9,941.18	12,298.81
May	11,808.22	22,932.74
June	15,019.69	29,181.76
July	15,645.55	31,561.77
August	16,415.18	33,048.68
September	17,515.00	31,469.00
Total	112,682.46	$205,010.18

TOTAL OIL RUNS, OHIO COUNTY, KENTUCKY
(October, 1922–September, 1925, inclusive.)

	Bbls.	Value
1922	1,265.61	$2,169.96
1923	9,789.21	14,177.04
1924	78,631.32	122,175.06
1925	112,682.46	205,010.18
Total	202,368.60	$343,532.24

DAVIESS COUNTY OIL PRODUCTION
(April, 1925–September, 1925, inclusive.)

1925	Bbls.	Value
April	85.67	$158.49
May	613.61	1,239.55
June	958.48	1,926.83
July	983.66	2,032.52
August	1,540.04	3,204.52
September	2,306.00	4,303.00
	6,487.46	$12,864.91

TOTAL OIL RUNS, PELLVILLE DISTRICT, KENTUCKY
(By counties.)

	Bbls.	Value
Hancock County	96,575.56	$167,611.66
Ohio County	203,368.60	343,532.24
Daviess County	6,487.46	12,864.91
	306,431.62	$524,008.81

Summary

The Pellville oil pool, discovered in 1920, is now definitely outlined, though many important offset locations still remain to be drilled. Outlying dry and salt water wells have about delimited the advancement of productive territory of commercial grade. The original oil strike was made in Hancock County and successful development has followed a southwestward trend into Ohio County with some scattered production coming from close in leases in Daviess County. The Indian Pipe Line Co. entered the field with its line to Owensboro and made its first runs from Hancock and Ohio Counties in October, 1922. Production was first run from Daviess County leases in April, 1925. Total runs from this entire field up to and including September, 1925, were 306,431.62 barrels, valued at $524,008.81.

A factor of distinction and unusual importance in the Pellville oil pool has been the occurrence of four separate productive oil horizons. Except in the shallow "Pottsville sand" fields of Floyd, Knott and Knox Counties of eastern Kentucky, this circumstance is not duplicated elsewhere in this state. The productive Pellville sands in descending order are the "Stevens," the "Jett," the "Jackson" and the "Barlow" sands. Each of these is definitely correlated with a well known stratigraphic member of the Chester (Mississippian) series, and each it a true silica sand of shallow depth. No productive limestones are known in this field, and deep oil and gas sands, productive elsewhere, are also unknown. Because of the nature of these sands, the oil production in the Pellville pool has not been spectacular, as was the case in the Warren and Lee County, Kentucky, fields. The curve of production increase has been steady and strong, and every indication leads to the conclusion that the productive life and decline curve of this field and its individual leases will be of the same character. The productive record of this field

when complete will undoubtedly closely resemble that of the important Berea and Wier "true sand" fields of northeastern Kentucky.

These prospects, coupled with the fact that the region is reasonably accessible to rail lines and automobile highways, has stimulated prospecting in the Pellville district. Low topographic relief has operated to advance development. A good collecting pipe line service has brought quick returns to the successful "wild-catting" ventures. These factors, all combined, have been and will continue to be a real inducement to operators in this field, who, if they cannot "bring in" gushers, have a reasonable assurance of success in drilling leases favorably located as to structure. The Pellville oil pool, taken as a whole, gives promise of being one of the really important pools of Kentucky. Its location and general geology is logically suggestive of the possible occurrence of other important undiscovered oil pools similarly situated within the periphery of the Western Coal Field.

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Written August, 1923.
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II.

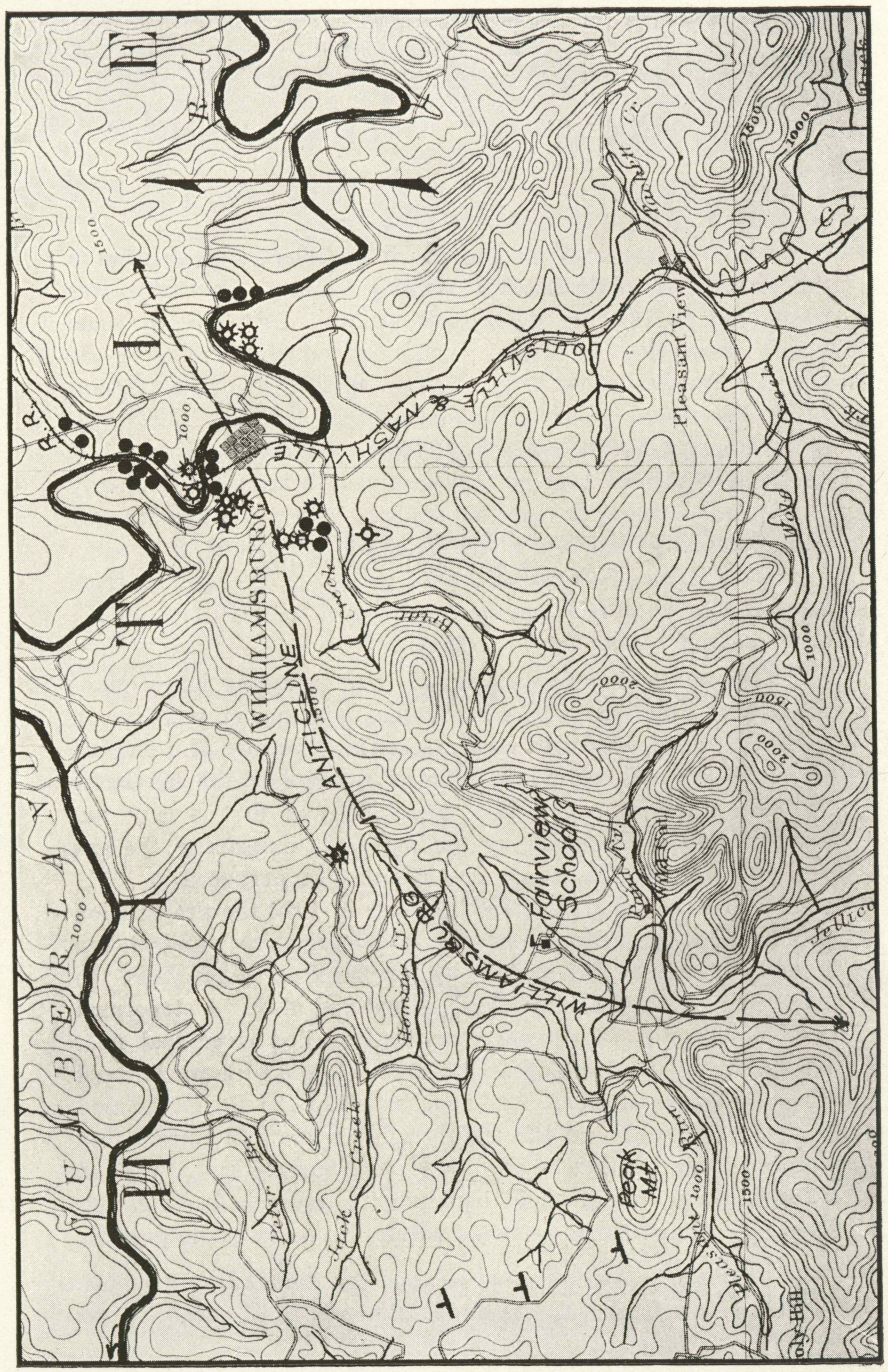
OIL AND GAS GEOLOGY OF THE WILLIAMSBURG REGION

Introduction

The occurrence of oil and gas in commercial quantities in the vicinity of Williamsburg, Whitley County, Kentucky, was recognized in 1904 by J. B. Hoeing, who discussed[1] at some length the various productive and nonproductive sands of the region. The first wells in this section were drilled in 1902, and produced oil and gas from shallow sands in the Pottsville series, the producing depths being from 300 to 500 feet, and from 700 to 800 feet. An attempt by the Iroquois Oil and Gas Company to deepen a number of these old wells in later years and thereby increase their production in the field, was successful in producing rather large quantities of natural gas at depths ranging from 1,155 feet to 1,180 feet and from 1,365 feet to 1,370 feet, in the Big Lime (Mississippian).

The reported occurrence of this gas in rather large quantities caused the writer to make a reconnaissance of this area in April, 1920, the results of which were the discovery of a doming anticline, the axis of which followed a trend to the northeast through Williamsburg. This structure was first briefly announced in the literature by the writer in describing the gas field adjoining Williamsburg in a manuscript prepared in 1921[2] and published in January, 1922. Later in 1922 the preparation of a reconnaissance structural map of the region was undertaken by the writer, who was assisted by Mr. James S. Hudnall in the field during the months of March, April and May. A structural map based on the Lily coal (commonly called river coal near Williamsburg) was prepared by running levels with an Aneroid barometer checked upon bench marks along the Louisville and Nashville railroad and the Cumberland river. In those areas removed from the railroad and the river, a barometer was read at Williamsburg, and the field barometer was checked against it. The map is regarded as accurate within the limits made possible

[1] Oil and Gas Sands of Kentucky. Hoeing. Ky. Geol. Survey, Bull. No. 1, Series III, 1905.
[2] Conservation of Natural Gas in Ky. Jillson. 1922, pp. 50-51.



THE WILLIAMSBURG ANTICLINE

The base is the U. S. G. S. Williamsburg topographic sheet, reproduced here to scale 1:125,000. A few of the producing wells and dry holes have been located.

by a base of reconnaissance topography which was executed to the scale of 1:125,000 by the U. S. Geological Survey.[3]

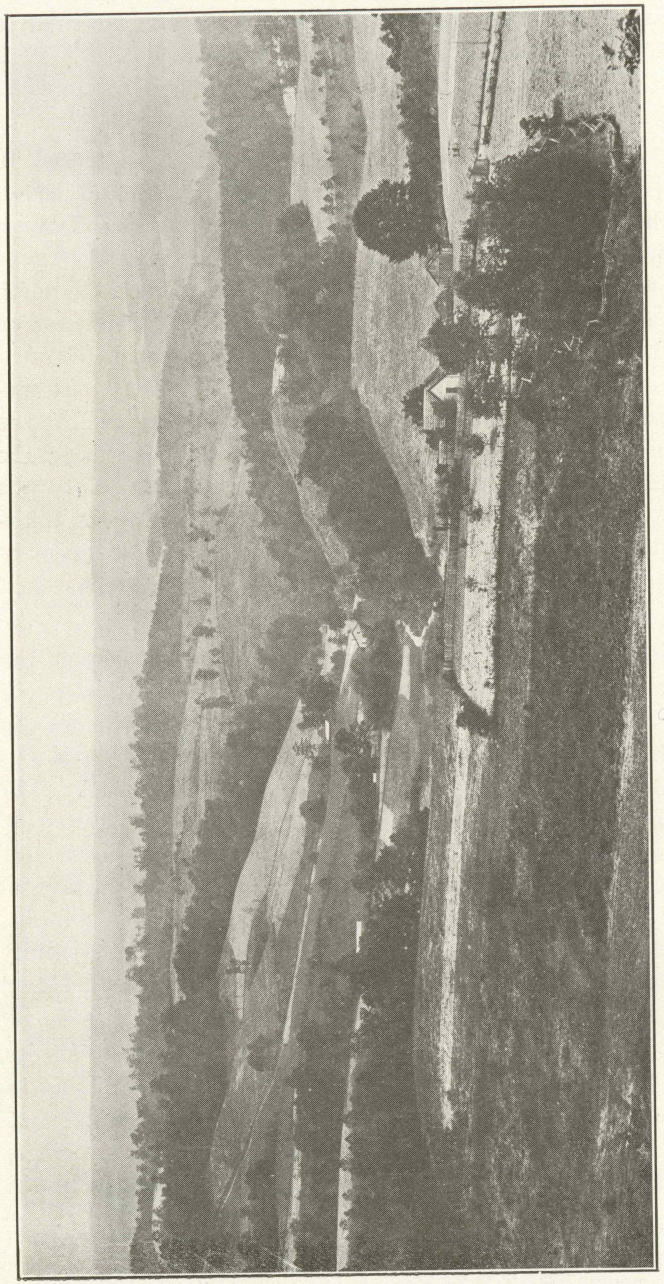
Location

Williamsburg, the seat of Whitley County, is located in the central part of the county on the Cumberland river, the south by Claiborne, Campbell and Scott Counties, Tennescreated in 1818 from parts of Knox, Laurel, Pulaski and Wayne County, covering about 456 square miles, is bounded on the north by Laurel County; on the east by Bell and Knox Counties; on the south by Claiborne, Campbell and Scott Counties, Tennessee, and on the west by McCreary County, Kentucky. It was created in 1818 from parts of Knox, Laurel, Pulaski and Wayne Counties. Later its western boundary was established on the Cumberland river and Jellico Creek when McCreary County was formed. Whitley was named in honor of Colonel William Whitley, a celebrated Kentucky pioneer whose fine old brick residence still stands on the old wilderness road near Crab Orchard in southern Lincoln County, Kentucky.

Whitley County is located in southeastern Kentucky in the Jellico coal field about 55 miles in air line slightly west of north of Knoxvillee, Tennessee, and a little over 90 miles in an air line slightly east of south of Lexington, Kentucky. It is approximately 140 miles south of east of Louisville, Kentucky, 170 miles southeast of Cincinnati, Ohio, and 150 miles northeast of Nashville, Tennessee. The county is traversed on a north and south line by the Cincinnati-Knoxville main line of the Louisville and Nashville railroad. Corbin, a town of 3,406 population,[5] on the Laurel river, is found in the northern part of Whitley County and is a junction town for the Cumberland River Division of the Louisville and Nashville railroad.

Jellico, a coal mining town with 2,349 inhabitants,[6] is located on the Kentucky-Tennessee line, part of the town being in each state. Williamsburg is 15 miles in an air line northwest of the Pine Mountain. Though situated on the Cumberland river, water transportation from Williamsburg to Burnside, Pulaski

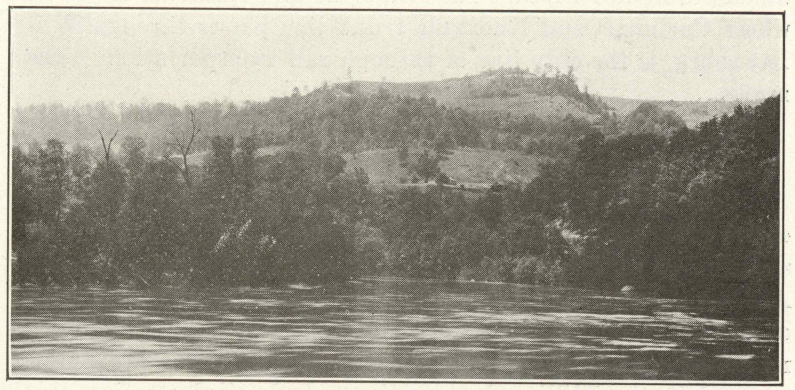
[3] Williamsburg (Ky.-Tenn.) Quadrangle. Knight and Yeates. U. S. G. S., 1894.
[4] U. S. Census, 1920.
[5] U. S. Census, 1920.
[6] U. S. Census, 1920.



BRIAR CREEK VALLEY

The view is nearly due east down the drainage from an elevation of about 1,400 feet. The sharp bend of the Cumberland River above Williamsburg is at the foot of the distant ridge.

County, and points below is impossible at present because of the lack of slack water and the occurrence of the Cumberland Falls (56 feet high) about 16 miles in an airline northwest of the town.



CREST OF WILLIAMSBURG ANTICLINE

This view along the Cumberland River is from the vicinity of the Steely lease. The topography is characteristic of the region.

Topography and Drainage

The topography of the Williamsburg area is thoroughly characteristic of the southeastern Kentucky coal field. The ridges are high, narrow and irregular. The valleys are V-shaped and meandering. There is very little bottom land, except closely adjacent to the Cumberland river, and no flat uplands occur, except in a region known as the "Flatwoods," which lies on the western boundary of the area under discussion, north of Peak Mountain (al. 1,750 ft., approx.) and west of Jellico Creek. Differences of elevation varying from 600 to 1,000 feet are common throughout this region. Altitudes ranging from 1,800 to 2,000 feet are common on the larger mountains of the region, and a few elevations in excess of 2,200 feet occur on the peaks between Clear Fork of the Cumberland river and Jellico Creek. The elevation of the Cumberland river bottom is about 900 feet in the vicinity of Williamsburg, and tributary drainage rises above this altitude. The elevation of the Louisville and Nashville railroad at the Williamsburg depot is given as 939 feet.

The principal drainage of the region is the Cumberland river and its tributaries, chief among which are the Clear Fork

and Jellico Creek. Each of these latter streams flow to the northwest to join the Cumberland river. Smaller creeks of minor importance are Brier and Wolf Creeks, tributaries to the Cumberland river, and Ryan Creek, Pleasant Run and Paint Creek, tributaries to Jellico Creek. The Louisville and Nashville railroad, whose Cncinnati and Knoxville trunk line passes through Williamsburg, is the only line of through rail transportation in the region.

Stratigraphy—Surface Rocks

Sediments of Pottsville age (basal Pennsylvanian) cover the entire area under discussion. These consist of an alternating sequence of sandstones, sandy conglomerates, shales and coals. Although the Mississippian limestone is exposed in the vicinity of High Cliff on the Clear Fork along the Pine Mountain fault, no sediments of greater age than the coal measures are found exposed in the Williamsburg region. A detailed stratigraphic section, totaling 1,602 feet, showing all of the above drainage sediments of the Williamsburg region, is given herewith:

GENERAL STRATIGRAPHIC SECTION

WHITLEY COUNTY, KY.

Pottsville Sediments (Pennsylvanian) all exposed.

Sandstone	30
Shale, sandy	40
Limestone, fossil	7
Shale	25
Coal, cannel	1½
Sandstone (clifted)	40
Shale and sandstone	100
Coal	3½
Shale	10
Sandstone	20
Shale, black	3
Shale, fossils	25
Shale, blue	10
Coal (fire clay)	2½
Shale and sandstone	120
Sandstone	3
Coal	1
Shale	55
Coal and shale	3

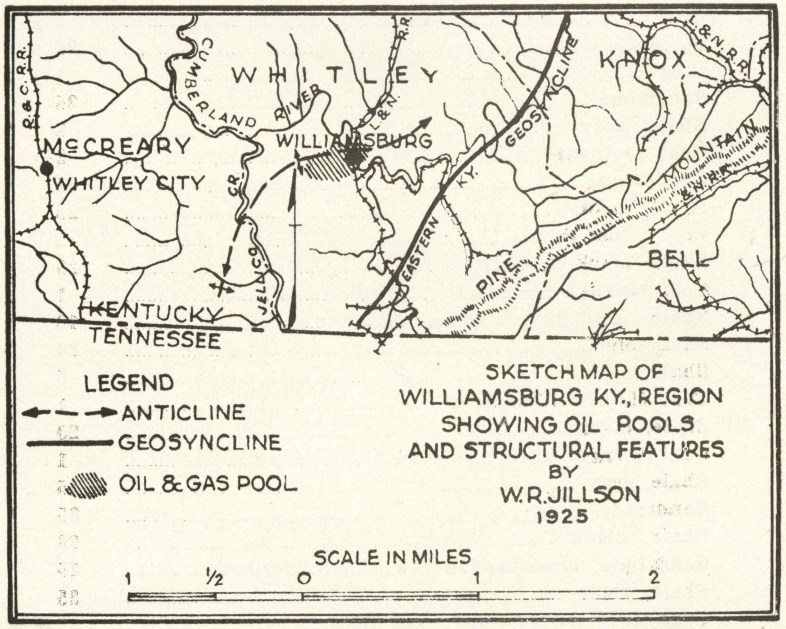
Sandstone	25
Shale, sandy	30
Shale	20
Coal (semi-cannel)	1½
Shale	45
Conglomerate	65
Coal	1½
Shale	35
Coal	1½
Sandstone	35
Shale, gray	3
Coal (Jellico)	3½
Sandstone	55
Shale, sandy	25
Coal (Blue Gem)	2
Shale, black	25
Coal (Stray)	1
Shale	10
Sandstone	20
Shale	5
Coal (Lower Blue Gem)	1
Shale, black	20
Coal (Stray)	1
Shale, gray	15
Sandstone, pink	35
Shale, black	20
Sandstone, cross-bedded	15
Shale, black	35
Coal (Lily—River coal) (Key Bed)	2
Shale (position of Williamsburg)	40
	1,062.50

Stratigraphy—Subsurface Rocks

The unexposed rocks of the Williamsburg region within 3,000 feet of drainage consists of sandstones, shales, sandy conglomerates, coals, limestones and calcareous shales. These sediments are all of the Palezoic age. The uppermost subsurface rocks are a continuation of those found above drainage. These lower coal measures (Pottsville) composed of sandstones, shales, sandy conglomerates and coals are about 1,000 or 1,100 feet in thickness, as evidenced by an examination of a number of well kept drill records.

Rocks of the Mississippian age, limestones, shales, sandstones and fine sandy shales totaling about 500 or 600 feet underlie

the subsurface continuation of the coal measures. Included within this stratigraphic division and in its upper part is found the Big Lime (Chester) and Big Injun (Meramec) oil and gas sands. The top of the Devonian sediments—Chattanooga Black



Shale, 90-150 feet in thickness—occurs at a depth of about 1,700 to 1,750 feet below Williamsburg. The corniferous limestone underlying the shale is poorly interpreted in all deep well records, but is probably about 50 or 60 feet in thickness. It is thought that the Silurian formations, limestones and calcareous gray-green shales, and red beds will set in here at about 1,800 to 1,825 feet in depth, but their approximate thickness is unknown. Ordovician rocks, limestones and calcareous blue-gray shales should be encountered at about 2,300 feet in depth, while the top of the Trenton limestones (Mohawkian) might be expected at about 3,000 or 3,100 feet. The deep John Foley No. 1 well (3,350 feet) located on structure pierced these calcareous sediments but found them dry. For a further consideration of the subsurface stratigraphy the reader is referred to a few selected well logs presented herewith.

Well Records
WHITLEY COUNTY

LOG No. 1.

J. P. SHARP FARM
Rockhold Station

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	14	14
Black shale	36	50
White lime	5	55
Coal	1½	56
Blue slate	88½	145
White sand	10	155
Black slate	30	185
White sand	20	205
Black slate	110	315
Gray sand	190	505
Black slate	40	545
White sand	165	710
Black slate	30	740
White sand—oil show	230	970
Black slate	35	1005
Sand	26	1031
Coal	2	1033
Black slate	4	1037
White sand	5	1042
Black shale—base of Pottsville	15	1057
MISSISSIPPIAN SYSTEM		
White lime	5	1062
Black shale	4	1066
White sand	25	1091
White shale	60	1151
White lime	54	1205
White shale	50	1255
White lime	30	1285
White shale	5	1290
White lime	265	1555
Brown sand	35	1590
Blue sand	27	1617
Blue shale	188	1805
DEVONIAN SYSTEM		
Brown shale (Devonian)	120	1925
White shale (Devonian)	15	1940
Brown shale (Devonian)	5	1945
White limestone	60	2005
SILURIAN SYSTEM		
Red shale	5	2010

Strata	Thickness	Depth
SILURIAN SYSTEM		
White shale	35	2045
Red shale	15	2060
White shale	5	2065
White lime	70	2135
ORDOVICIAN SYSTEM		
Shale	70	2205
White lime	25	2230
Total depth		2230

LOG No. 2.

WATER CO. WELL
Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift	28	28
Gravel	3	31
Slate	14	45
Sand—oil at 47	24	69
Slate	11	80
Sand—oil at 87	10	90
Slate	30	120
Sand	8	128
(All in Pottsville).		
Total depth		128

LOG No. 3.

PERKINS' WELL
Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Clay	20	20
Black sand	10	30
Blue slate	60	90
Sand—oil at 100	10	100
Slate	50	150
White sand	28	178
Coal	2	180
White sand	60	240
Slate	5	245
White sand—oil at 360	120	365
Slate	5	370
Coal	5	375
(All in Pottsville).		
Total depth		375

LOG No. 4.

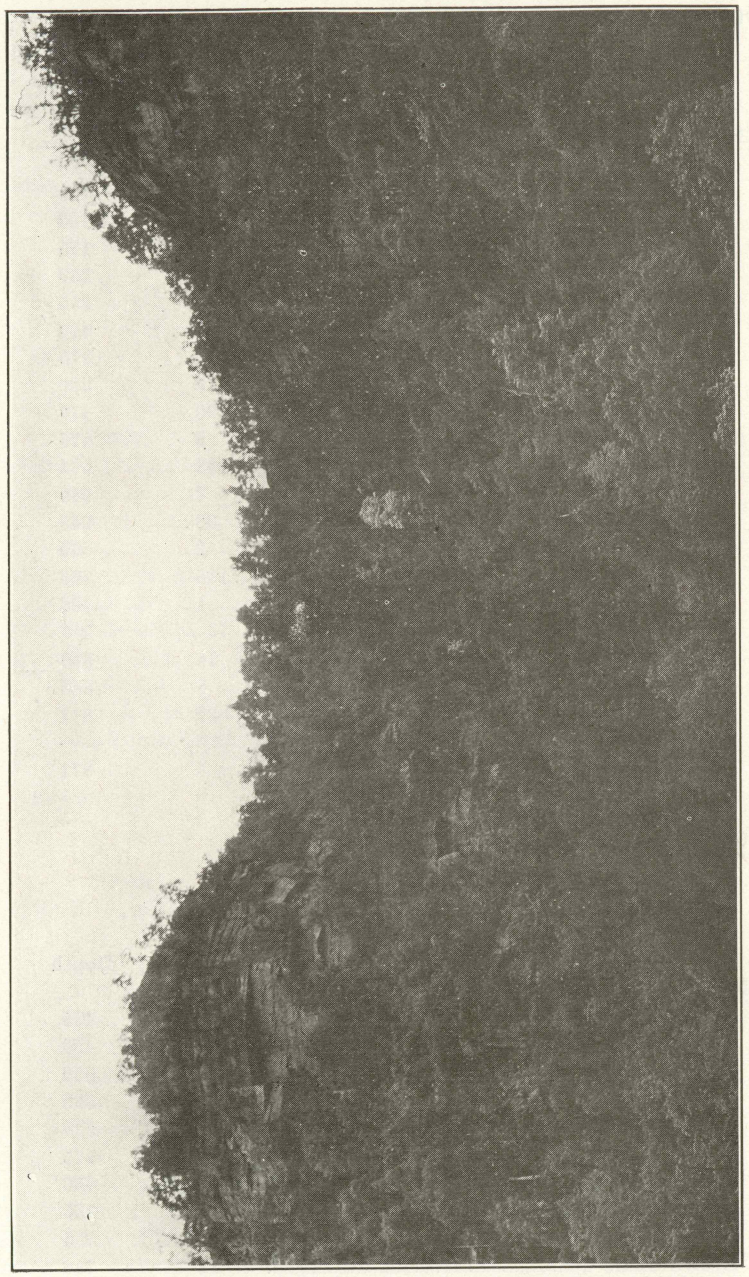
NELSON WELL No. 2
Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift	28	28
Slate	102	130
Sand	35	160
Slate	10	175
White sand	75	250
Slate	5	255
White sand	115	370
Coal	5	375
Slate	5	380
White sand	90	470
Slate	5	475
White sand	98	573
Slate	7	580
White sand—oil at 645	68	648
Coal	2	650
Slate and shells	115	765
Slate	1	766
White sand—oil show at 770 and 805, salt water at 838	74	840
Sand	8	848
Slate	23	871
(All in Pottsville).		
Total depth		871

LOG No. 5.

ELECTRIC LIGHT PLANT WELL
Williamsburg
(Partial record)

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
White sand—oil at 385	50	425
Slate	5	430
White sand	100	530
Slate	5	535
White sand	35	570
Slate	5	575
White sand—oil and gas at 605	85	660
Slate and shells	75	735
White sand—oil and gas at 745	20	755
Brown shale	11	766
White sand (base of Pottsville)	45	811



WILLIAMSBURG SAND ON OUTCROP
High above the waters of the Clear Fork of the Cumberland River in the Gap the Pottsville conglomerate sandstone producing near Williamsburg at about 800 feet is brought above drainage by the Pine Mountain Fault.

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Blue slate	10	821
Pink slate—Mauch Chunk	5	826
Total depth		826

LOG No. 6.

SUTTON FARM
1 mile S. W. of Williamsburg

Strata	Thickness	Depth
Soil	5	5
Sand and slate	140	145
Shale and shells	110	255
Black slate	147	402
Sand	185	587
Slate	15	602
Sand	15	617
Slate	80	697
White sand—gas at 784	87	784
Black shale and slate	19	803
Sand—oil at 957	172	975
(All in Pottsville).		
Total depth		975

LOG No. 7.

G. W. RAINS No. 2
Near Williamsburg
(Partial record)

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
		753
Sand—oil at 770, 790 and 811	82	835
Shale (with coal)	45	880
MISSISSIPPIAN SYSTEM		
Sand	23	903
Light shale	15	918
Lime	17	935
Dark shale	10	945
Lime	10	955
Pink slate—Mauch Chunk	45	1000
Lime	20	1020
Pink slate—Mauch Chunk	10	1030
Lime	15	1045
Light shale	5	1050
Lime	25	1075

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale and lime	95	1170
Lime—gas at 1369	211	1381
Total depth		1381

LOG No. 8.

STEELY FARM No. 2
1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	10	10
Sand	20	30
Slate	105	135
Sand	150	285
Lime	20	305
Sand	75	380
Lime	5	385
Coal	5	390
White sand	202	592
Shale	2	594
Black shale	30	624
Coal	2	626
Sand—salt water at 628	24	650
Slate and shells	100	750
Sand	24	774
Black slate (base of Pottsville)	6	780
MISSISSIPPIAN SYSTEM		
Pink rock—Mauch Chunk	20	800
Blue slate	35	835
Red rock	10	845
Lime	10	855
Blue slate	7	862
Total depth		862

LOG No. 9.

STEELY FARM No. 4
1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift	30	30
Black slate	19	49
Sand	4	53
Black slate	82	135
White sand	170	305

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Lime	5	310
White sand	28	338
Slate	2	340
Sand	40	380
Lime (?)	5	385
Coal	5	390
White sand	200	590
Slate	5	595
Black shale	20	615
Coal	2	617
White sand	33	650
Black shale	5	655
Sand	15	670
Slate	5	675
Sand	15	690
Slate	10	700
Brown shale	44	744
Sand—oil	46	790
Slate (base of Pottsville)	5	795
MISSISSIPPIAN SYSTEM		
Pink rock—Mauch Chunk	5	800
Total depth		800

LOG No. 10.

STEELY FARM No. 5
1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift	25	25
Sand	5	30
Slate	15	45
Sand	10	55
Slate	25	80
Black slate	55	135
White sand	200	335
Slate	5	340
White sand	40	380
Lime	5	385
Coal	5	390
White sand	202	592
Slate	3	595
Sand	55	650
Coal	2	652

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sand—gas at 660	8	660
Lime	10	670
Slate	15	685
Shale	59	744
White sand—oil at 750, 770 and 790	54	798
Slate	6	804
(All in Pottsville).		
Total depth		804

LOG No. 11.

STEELY FARM No. 8

1 mile N. of Williamsburg

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift and clay	20	20
Slate	10	30
Blue shale	20	50
Coal	2	52
Slate	93	145
Gray sand	25	170
White sand	170	340
Slate	10	350
White sand	55	405
Coal	5	410
White sand—oil at 550	140	550
Sandstone	5	555
Slate	5	560
White sand	43	603
Shale	2	605
Slate	5	610
Sand	50	660
Coal	2	662
Sand	3	665
Lime	10	675
Slate	15	690
Sand	15	705
Slate and shells	20	725
Shale (base of Pottsville)	41	766
MISSISSIPPIAN SYSTEM		
Sand and pink rock—Mauch Chunk	29	795
Red rock—Mauch Chunk	30	825
Black sand and slate	21	846
Red rock—Mauch Chunk	10	850
Black slate	4	860
Lime	10	870

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Slate and shells	30	900
Slate	10	910
Red rock	10	920
Lime	5	925
Slate and shells	60	985
Slate	15	1000
Lime	35	1035
Slate	5	1040
Lime	285	1325
Granite (?)	25	1350
Lime	20	1370
Lime and flint	5	1375
Flint	15	1390
Lime and flint	30	1420
Lime	35	1455
Slate	10	1465
Black shale	25	1490
Shale	20	1510
Lime	20	1530
Slate	40	1570
Lime	10	1580
DEVONIAN SYSTEM		
Brown shale (Devonian)	120	1700
White slate	20	1720
Gray sand	5	1725
White slate	15	1740
SILURIAN SYSTEM		
Blue slate	30	1770
Slate and shells	50	1820
Slate	10	1830
Sand	20	1850
Slate	10	1860
Sand	10	1870
ORDOVICIAN SYSTEM		
Sand and lime	20	1890
Lime	30	1920
Lime and red rock	15	1935
Lime	235	2170
Total depth		2170

LOG No. 12.

WELL AT MOUTH OF CLEAR FORK
(Partial record)

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale and coal	828	828
Shale	57	885
Sand (base of Pottsville)	75	960
MISSISSIPPIAN SYSTEM		
Lime	10	970
Pink rock—Mauch Chunk	35	1005
Lime	20	1025
Shale	5	1030
Lime	30	1060
Shale	30	1090
Lime	15	1105
Shale	55	1160
Lime	370	1530
Gas well.		
Total depth		1530

LOG No. 13.

S. M. Brown, No. 1, lessor. Completed: Jan. 16, 1905. Production: Dry; casing pulled, well abandoned. Authority: New Domain Oil & Gas Co.

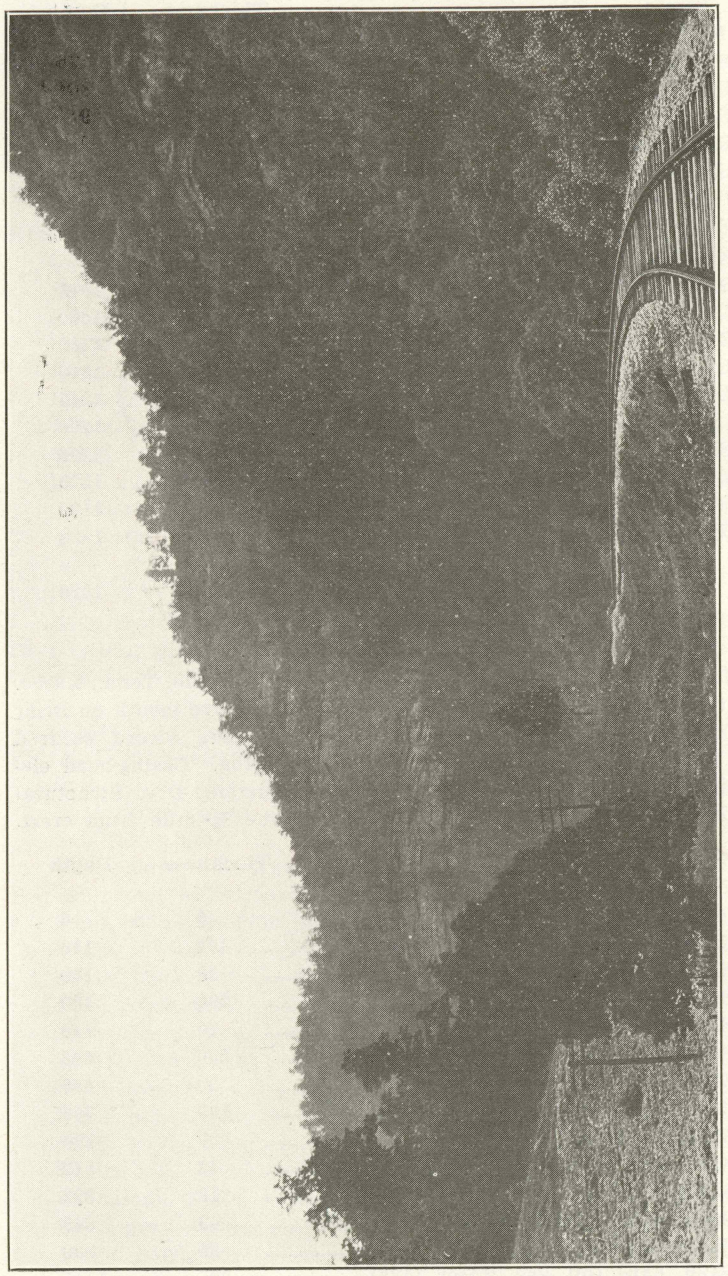
Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil, yellow, soft	15	15
Shale, hard, black	85	100
Sandstone, gray, hard	10	110
Shale, hard, black, soft	25	135
Sandstone white, hard	4	140
Sand, white, medium	12	152
Shale, brown, soft	33	185
Shale, black, soft	10	195
Coal, black, soft	2	197
Shale, brown, hard, limy	5	202
Shale, brown, soft	108	310
Sand gray, soft	90	400
Shale, white, soft, limy (gas 415)	15	415
Sand, white, soft	85	500
Shale, hard, black, soft	20	520
Sandstone, white, hard, shaly	15	535
Sand, gray, hard	165	700
Shale, hard, brown	20	720
Sand, yellow, hard	50	770

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, hard, yellow	5	775
Sand, white, hard (oil show 800)	25	800
Sand, gray, hard	100	900
Shale, hard, black	54	954
Sandstone, gray hard	29	983
Coal, black, soft	2	985
Shale, hard, white, soft	10	995
MISSISSIPPIAN SYSTEM		
Shale (red rock), hard	18	1013
Limestone and shells, red, very hard	37	1050
Shale (red rock), very hard	50	1100
Limestone (Big Lime), white, very hard	140	1240
Limestone, blue, hard	5	1245
Limestone, blue. hard	45	1290
Shale, black, soft	6	1296
Limestone, white, hard (gas 1470)	234	1530
Sand, white, hard	60	1590
Shale, blue, soft	230	1820
Total depth		1820

LOG No. 14.

John Foley, No. 1, lessor. Iroquois Oil Co., Knoxville, Tenn., lessee. Location: ¾ mile west of Williamsburg, ½ mile above mouth on Briar Creek. Commenced: September, 1920. Incomplete record secured July 1, 1921. Driller and authority: Tom Langton. Casing-head elevation: 1036 A. T. 2 feet above Lily roal. Production: Dry. Structural position: South flank of Williamsburg Anticline ¾ mile from crest.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Clay and soil	6	6
Sandstone	104	110
Shale, hard	30	140
Sand, hard	290	430
Shale, hard	10	440
Sand, hard	200	640
Shale, hard	20	660
Sand, hard (oil show 728)	103	763
Shale, hard	7	770
Sand hard	42	812
Shale, hard	10	822
Sand, hard (Williamsburg oil sand 865)	43	865
Shale, hard	25	890
Sand, hard (oil, gas, water 1122)	225	1145



CLEAR FORK GAP

All water level gaps in the Pine Mountain are similar. This gorge cut by the Clear Fork is much like the Cumberland gateway at Pineville, and the "Breaks of Sandy."

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Lime shell and shale, hard (Little Lime)	20	1165
Limestone, hard (Big Lime)	80	1245
Shale	10	1255
Limestone (Big Lime)	245	1500
Shale, hard	10	1510
Flint rock	40	1550
Shale, hard	10	1560
Lime shell	20	1580
Shale, hard	20	1600
Lime shell	10	1610
Red rock	15	1625
Shale, hard	75	1700
DEVONIAN SYSTEM		
Shale, brown (Chattanooga)	90	1790
Lime shell	20	1810
SILURIAN SYSTEM		
Shale, hard	40	1850
Limestone, brown	850	2700
Limestone, black	15	2715
Limestone, brown	635	3350
Total depth, July 1, 1921		3350

NOTE.—The Silurian-Ordovician contact occurs within the upper quarter of the 850 feet of brown limestone above 2,700 feet.

LOG No. 15.

Rose, No. 1, lessor. Iroquois Oil Co., lessee. Location: 1½ miles west of Williamsburg. Completed in the spring of 1920. Production: about 4,000,000 cu. ft. gas. Authority: E. C. Dicel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	2	2
Sand	148	150
Shale, hard	120	270
Sand	320	590
Shale, hard	20	610
Sand	95	705
Shale, hard	25	730
Sand	85	815
Shale, hard	83	898
Sand (some oil)	35	933
Shale, hard	30	963

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale (red rock), sandy	12	975
Shale, hard	15	990
Limestone (Little Lime)	20	1010
Shale, hard	90	1100
Limestone (Big Lime), (gas 1,265)	205	1305
Total depth		1305

LOG No. 16.

Baptist Educational Society, No. 1, lessor. Empire Oil & Gas Co., lessee. Location: First left hand branch of Dog Slaughter Creek, 1 mile north of Dog Slaughter Creek. Completed: 1918. Contractors: J. H. Wilt Drilling Co. Authority: E. C. Disel.

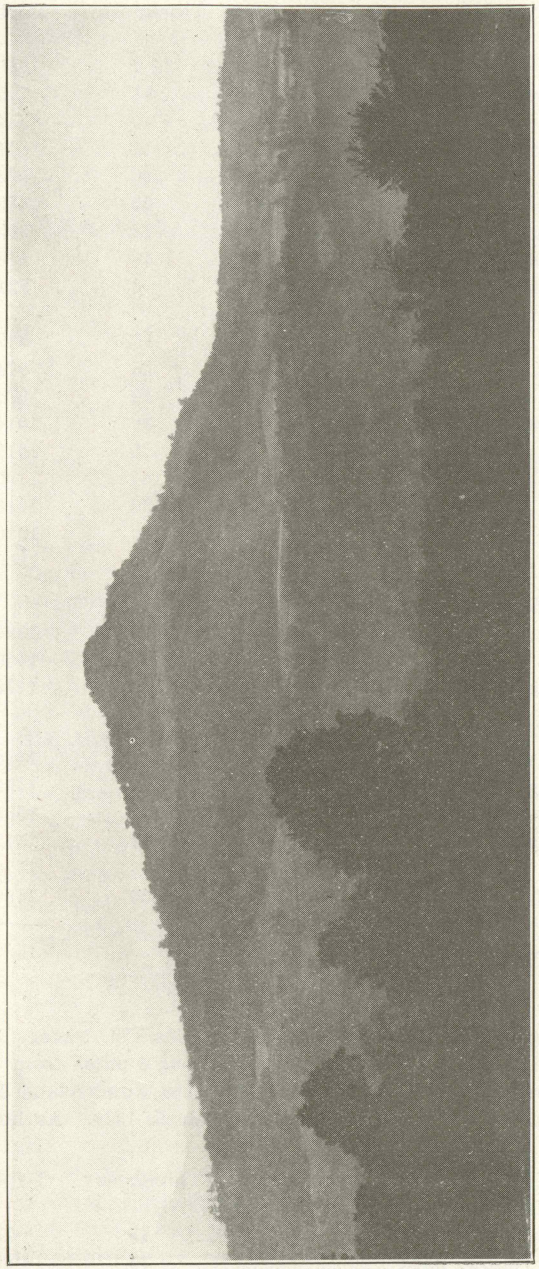
Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift, yellow, soft	6	6
Rock, very firm, yellow, hard	180	186
Shale, hard, black and shells	35	221
Shale, gritty, white firm and sand	85	306
Shale, black, soft and coal	15	321
Sand, gray, hard	100	421
Shale, hard, black and soft	10	431
Shale, black, hard	7	438
Shale, hard, blue, sticky	30	468
Shale, hard, blue and shells	70	538
Shale, shell, gravy, very hard, limy	20	558
Shale, sticky, red, soft	15	573
Sand, red firm	10	583
Sand, pink, hard	5	588
Coal, black, soft	7	595
Sand, white, hard	15	610
MISSISSIPPIAN SYSTEM		
Shale, hard, red, soft	5	615
Shell, hard, dark	10	625
Shale, hard, white, soft	15	640
Sand, white, hard	20	660
Shale, hard, white, caving	10	670
Shale, hard, dark, limy	10	680
Shell, dark, hard	7	687
Limestone, hard, dark	12	699
Shale, hard, white, soft	5	704
Sand, white, hard, very close (Maxon)	40	744
Limestone, white, soft (Little Lime)	4	748

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sand, white, hard	7	755
Limestone, white, soft, Big Lime (184)	34	789
Limestone, white, hard, Big Lime (184)	45	834
Limestone, brown soft Big Lime (184)	10	844
Limestone, brown, firm, Big Lime (184)	20	864
Limestone, brown, hard, Big Lime (184)	25	889
Limestone, brown, soft, Big Lime (184)	14	903
Flint, hard, dark, Big Lime (184)	15	918
Limestone, brown, soft, Big Lime (184)	6	924
Limestone, flint, hard, dark, "Big Lime" (184)	15	939
Sandstone, gray, firm, limy (odor of gas)	35	974
Shell, hard, dark	10	984
Limestone, white, soft	30	1014
Sand, pink, soft, shaly	5	1019
Sand, gray, hard	161	1180
Shale, hard, white, soft	30	1210
Shell, hard, black	10	1220
Shale hard, green, firm (New Providence)	80	1300
DEVONIAN SYSTEM		
Shale, black, soft (Chattanooga)	90	1390
Shale, hard, white, soft	60	1450
Limestone, gray, hard	20	1470
SILURIAN SYSTEM		
Shale hard, white, soft	10	1480
Limestone, gray, hard	12	1492
Shale, hard, white, soft	10	1502
Limestone, gray, hard	10	1512
Shale, hard, blue, firm	8	1520
Limestone, black, hard	60	1580
Total depth		1580

LOG No. 17.

H. M. Young, No. 1, lessor. Empire Oil & Gas Co., lessee. Location: about 13 miles from Williamsburg, and about 6 miles from Cumberland Falls, on the road from Williamsburg to Cumberland Falls. Head of Dog Slaughter Creek. Completed: Feb. 5, 1919. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Drift, yellow, soft (little water)	15	15
Sand, rock, yellow, hard	45	60
Sand, gritty, blue, firm (hole full of water)	90	150



PEAK MOUNTAIN
This symmetrical upland is about 2,150 feet high. The view is from Fairview Schoolhouse with Jellico Creek flowing to the right in the middle distant valley.

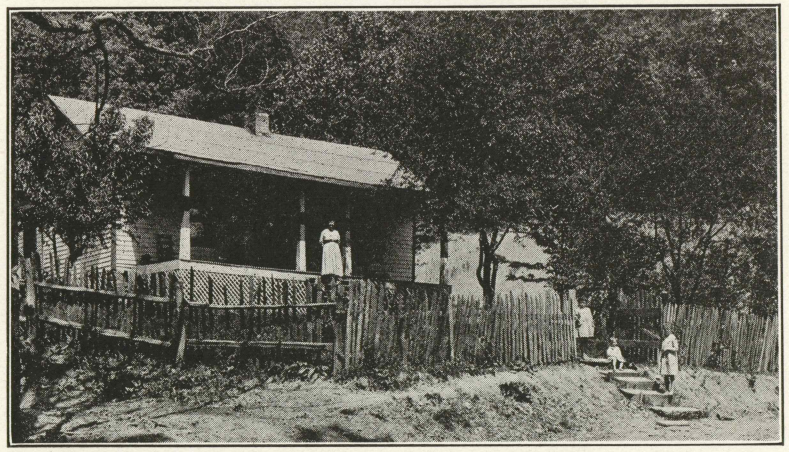
Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, hard, black, soft	35	185
Sandstone, hard white	10	195
Sand, gray, soft	55	250
Shale, hard, black, soft	10	260
Shale, white, hard, sandy	65	325
Shale, hard, brown, soft	40	365
Sandstone, gray, hard	10	375
Sand, white, medium (settled quickly)	80	455
Shale, hard, black, soft	3	458
Shale, gray, hard, limy	14	472
Shale, hard, brown, soft	4	476
Sand, white, hard, medium	52	528
Coal, black, soft	1	529
Shale, hard, brown, soft	22	551
Sandstone, hard, gray (little gas 555)	10	561
Shale, hard, blue, soft and shells	74	635
Sandstone, hard, gray	10	645
Shale, hard, brown, soft	15	660
Sandstone, dark, very hard	10	670
Shale, hard, brown, soft	15	685
Sandstone, gray, hard	10	695
Shale, hard, brown	15	710
Limestone black, very hard	5	715
Shale, brown, soft	10	725
Sandstone, gray, hard	20	745
Shale and shells, hard, white, soft	45	790
Sandstone, gray, hard	10	800
Shale, hard, red, soft	40	840
Shale, hard, gray, soft	15	855
Sand, gray, medium	22	877
Shale, hard, brown, soft	11	888
Shale, hard, gray, soft	14	902
Sand, gray, hard	10	912
MISSISSIPPIAN SYSTEM		
Limestone, brown, hard	28	940
Shale, hard, gray, soft	5	945
Limestone, brown, hard	5	950
Shale, hard, gray, soft	10	960
Limestone, white, hard	25	985
Shale, hard, white, soft	5	990
Limestone, hard, white, Big Lime (180)	10	1000
Limestone, hard, brown, Big Lime (180)	70	1070
Limestone, hard, gray, Big Lime (180)	5	1075
Limestone, hard, brown, Big Lime (180)	18	1093
Sand, soft, gray (light oil show), Big Lime		

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
(180)	5	1098
Limestone, brown, hard, Big Lime (180)	7	1105
Limestone, hard, gray, Big Lime 180)	35	1140
Limestone, gray, hard, Big Lime (180)	30	1170
Sand, brown, limy (50,000 cu. ft. gas at 1185)	31	1201
Total depth		1201

LOG No. 18.

Nelson,No. 1, lessor. The Cumberland Bend Oil Co., lessee. Location: 1½ miles southeast of Williamsburg. Completed in 1907. Shot Nov. 15, 1907, 90 qts. Production: about 1½ bbls. Authority: E. C. Disel, Williamsburg.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale and coal	455	455
Sand, white	10	465
Sand, white	30	495
Limestone, white	10	505
Sand, white	70	575
Shale, hard	7	582
Shale, hard	3	585
Sand white (gas 595; oil 605)	55	640
Sand, gray	20	660
Shale, hard, shelly	55	715
Sand, gray	20	735
Shale, hard	31	766



Mountain Home Near Williamsburg, Ky.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sand (gas)	1	767
Sand, white (oil 767 to 780)	13	780
Sand, white	25	805
Sand, white (oil and gas 809)	6	811
Shale, hard	4	815
Shale, hard	10	825
Flint rock	1½	826½
Total depth		826½

LOG No. 19.

G. W. Rains, No. 3, lessor. Location: mouth of Clear Fork Creek, 1½ miles southeast of Williamsburg. Cased Feb. 14, 1919. Shot with 10 qts. glycerine by the Ky. Glycerine Co. Recommenced drilling at 939 feet. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale and coal	939	939
Shale, hard	3	942
MISSISSIPPIAN SYSTEM		
Shale and shells, hard, pink (Mauch Chunk)	68	1010
Sand, gray	15	1025
Shale, hard, red	2	1027
Limestone, light	51	1078
Shale, hard, pink, light (Mauch Chunk)	48	1126
Limestone, blue	5	1131
Shale, hard, dark	46	1177
Limestone, black (show of oil)	14	1191
Limestone, black	24	1215
Shale, hard, light	6	1221
Limestone, light, Big Lime (253)	63	1284
Sand, light, Big Lime (253)	35	1319
Limestone, light, softer, Big Lime (253)	33	1352
Limestone, light, dark, Big Lime (253)	31	1383
Limestone, light, Big Lime (253)	20	1403
Limestone, dark, Big Lime (253)	4	1407
Limestone light, Big Lime (253)	7	1414
Limestone, light, Big Lime (253)	10	1424
Limestone, gray, Big Lime (253)	11	1435
Limestone, dark, Big Lime (253)	10	1445
Limestone, gray (oil show 1460-1463) Big Lime (253)	18	1463
Limestone, light, Big Lime (253)	4	1467

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Limestone, gray, dark, Big Lime (253)	7	1474
Sand, dark, gray	8	1482
Limestone, dark, gray and pebbles (gas 1515)	35	1517
Limestone, dark, gray, pebbles and crystal rock	5	1522
Sand, pebble and crystal rock	4	1526
Sand, gray and limestone	6½	1532½
Total depth		1532½

LOG No. 20.

Well at Saxton, ½ mile S. E. Saxton, between L. & N. and Southern R. R., 20 feet or more above railroad. Drilled by Clear Fork Oil and Gas Co. in spring of 1902.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale	130	130
Sandstone	30	160
Sandstone	10	170
Sandstone	10	180
Sandstone	30	210
Sandstone	35	245
Sandstone	30	275
Shale	20	295
Shale	5	300
Shale	30	330
Shale	50	380
Sandstone	45	425
Sandstone	35	460
Sandstone	35	495
Sandstone	30	525
Sandstone	30	555
Sandstone	30	585
Sandstone	25	610
Sandstone	25	635
Sandstone	20	655
Sandstone	20	675
Sandstone	15	690
Sandstone	15	705
Sandstone	15	720
Sandstone	15	735
Sandstone	10	745
Shale (cased at 747, 6¼″ casing)	10	755

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale	55	810
Sandstone	30	840
Shale	55	895
Shale and sandstone (salt water 935)	40	935
Sandstone	10	945
Sandstone (more water, rerimmed 8¾″)	15	960
Sandstone	10	970
Sandstone	15	985
Sandstone	10	995
Sandstone (8″ hole to 1000, cased)	10	1005
Sandstone	15	1020
Sandstone	20	1040
Sandstone	15	1055
Sandstone	10	1065
Sandstone	15	1080
Sandstone (oil show)	12	1092
Sandstone and shale	33	1125
Sandstone	30	1155
MISSISSIPPIAN SYSTEM		
Limestone	20	1175
Pink rock	35	1210
Shale, red	50	1260
Sandstone	40	1300
Limestone and shale	35	1335
Limestone and shale	35	1370
Shale and shell	30	1400
Shale and shell	25	1425
Limestone	25	1450
Limestone	25	1475
Limestone	30	1505
Limestone	25	1530
Shale and limestone	30	1560
Limestone	25	1585
Limestone	25	1610
Limestone	6	1616
Total depth		1616

WELL LOG No. 21.

Steely, No. 1, lessor. Cumberland Bend Oil & Gas Co., lessee. Location: 1 mile N. W. of Williamsburg, Whitley Co., Ky. Drilled: 1903. Drillers: E. C. and A. L. Disel.

Strata	Thickness	Depth
RECENT		
Sand, drift	35	35

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale	28	63
Coal	2	65
Shale	100	165
Sandstone	225	390
Coal	5	395
Shale	5	400
Sandstone	80	480
Shale	4	484
Sandstone, white (salt water at 503)	106	590
Shale	60	650
Sandstone	50	700
Shale	80	780
Shale and shells	20	800
Sandstone	60	860
Shale	30	890
MISSISSIPPIAN SYSTEM		
Shale, pink	20	910
Shale and lime shells	90	1000
Limestone	70	1070
Total depth		1070

10″ drive pipe 35 ft. 8″ casing 484 ft. 6¼″ casing at 591 feet. A lot of salt water at 503 ft.

WELL LOG NO. 22.

Steely No. 3, lessor. Cumberland Bend Oil & Gas Co., lessee Location: About 1 mile N. W. of Williamsburg, Whitley County, Ky. Drilled: 1903 by E. C. Disel.

Strata	Thickness	Depth
RECENT		
Sandstone, drift, gravel	30	30
PENNSYLVANIAN SYSTEM		
Sandstone, gray	5	35
Shale, black	105	140
Sandstone, gray	5	145
Shale	10	155
Sandstone, white	240	395
Coal	5	400
Sandstone, white	200	600
Shale, brown	30	630
Coal	2	632
Sandstone, gray	8	640
Sandstone, white	15	655
Shale	35	690

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, shells	70	760
Sandstone, gray	15	775
Sandstone, white	10	785
Sandstone, gray	12	797
MISSISSIPPIAN SYSTEM		
Limestone	5	802
Shale, black	10	812
Shale, pink	8	820
Total depth		820

Drive pipe 30 ft. 6¼″ casing 600 ft. Little oil at 445 ft. Oil 775 ft. Williamsburg Oil Sand 760 to 797 ft.

WELL LOG NO. 23.

Steely No. 6, lessor. Cumberland Bend Oil and Gas Co., lessee. Location: About 1 mile N. W. of Williamsburg, Whitley Co., Ky. Drilled: 1904 by E. C. Disel.

Strata	Thickness	Depth
RECENT		
Sand drift	35	35
PENNSYLVANIAN SYSTEM.		
Shale	10	45
Sandstone, gray	10	55
Shale	78	133
Coal	2	135
Shale	5	140
Sandstone, gray	10	150
Sandstone, white	180	330
Shale	5	335
Sandstone, white	45	380
Coal	5	385
Sandstone, white	195	580
Shale	10	590
Sandstone, white	40	630
Sandstone, gray	5	635
Coal	2	637
Sandstone, black	13	650
Shale, black, limestone	55	705
Shale	30	735
Sandstone, gray	10	745
Sandstone, white (oil 765)	55	800
Shale, black	11	811
Total depth		811

8¼" drive pipe 35 ft. 6¼ casing at 582 ft. Fresh water at 65 ft. Gas at 140 ft. Williamsburg oil sand top at 735 ft. Oil at 765 ft. Williamsburg oil, 765 to 775 ft.

WELL LOG No. 24.

Steely, No. 7, lessor. Cumberland Bend Oil & Gas Co., lessee. Location: 1 mile N. W. of Williamsburg, Whitley County, Ky. Drilled: 1905 by E. C. Disel.

Strata	Thickness	Depth
RECENT		
Sand, drift	30	30
PENNSYLVANIAN SYSTEM		
Shale	15	45
Sandstone	10	55
Shale, black	25	80
Shale	10	90
Shale, black	40	130
Coal	3	133
Sandstone, gray	22	155
Shale and limestone	10	165
Sandstone, white	160	325
Shale	10	335
Sandstone, white	45	380
Coal	5	385
Sandstone, white	205	590
Sandstone, black	5	595
Sandstone, white	40	635
Coal	2	637
Sandstone, gray black	23	660
Shale, limestone, shells	75	735
Sandstone, gray	10	745
Sandstone, white	56	801
Shale, black	15	816
MISSISSIPPIAN SYSTEM		
Shale, Pink	1	817
Total depth		817

8¼" casng drive pipe 35 feet. 6¼" casing at 661 ft. Oil at 670 ft. Oil at 715 ft. Wiliiamsburg Oil Sand at 735 ft. Oil at 750 ft.

WELL LOG No. 25.

T. J. Perkins, No. 1, lessor. Cumberland Bend Oil & Gas Co., lessee. Near Williamsburg, Whitley county, Ky. Driller: E. C. Disel.

Strata	Thickness	Depth
RECENT		
Clay, yellow	20	20

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, black	10	30
Shale, blue	10	40
Shale, black	30	70
Sandstone, gray	30	100
Shale	30	130
Sandstone, gray	10	140
Shale	10	150
Sandstone, white	18	168
Coal	2	170
Sandstone, white	70	240
Shale	5	245
Sandstone, white	120	365
Shale	5	370
Coal	5	375
Sandstone, white	50	425
Shale	5	430
Sandstone, white	100	530
Shale	5	535
Sandstone, white	34	569
Shale	6	575
Sandstone, gray	5	580
Sandstone, white	85	665
Shale, shells	73	738
Sandstone, white	12	750
Shale	14	764
Sandstone, gray	2	766
Sandstone, white	89	855
Sandstone, black	5	860
Shale	5	865
Total depth		865

8¼" drive pipe 40 ft. 6¼" casing 570 ft. Water at 90 ft. Oil at 100 ft. Oil at 260 ft. Oil at 385 ft. Gas and oil at 605 ft. Oil and gas at 745 ft. Williamsburg Oil Sand at 764 ft. to 855 ft. Salt water at 842 ft.

WELL LOG No. 26.

Electric Light Co. No. 2, lessor. (Second lessor: W. B. Siler). Cumberland Bend Oil & Gas Co., lessee. (Second lessee: Iroquois Oil and Gas Co.) Location: Near Williamsburg, Whitley Co., Ky. Manager: E. C. Disel.

Strata	Thickness	Depth
RECENT		
Sand, drift	28	28
PENNSYLVANIAN SYSTEM		
Shale	102	130
Sandstone, white	120	250
Shale	5	255
Sandstone, white	115	370
Coal	5	375
Shale	5	380
Sandstone, white	193	573
Shale	7	580
Sandstone, gray	5	585
Sandstone, white	63	648
Coal	2	650
Shale and shells	116	766
Sandstone, white	82	848
Shale	23	871
Shale, blue	12	883
MISSISSIPPIAN SYSTEM.		
Shale, red	15	898
Shale, blue, black	85	983
Limestone, black	10	993
Limestone, broken	29	1022
Shale (caving)	17	1039
Limestone	36	1075
Shale	5	1080
Limestone, broken	5	1085
Limestone, hard	8	1093
Limestone	7	1100
Total depth		1100

8¼″ drive pipe, 28 ft. 6¼″ casing 575 ft. Pulled casing and reamed from 575 ft. to 971 ft., drilled 8″ hole to 874 ft. and cased 6¼″ casing, and part with 6⅝″ casing. Oil at 645 ft. Williamsburg Oil Sand 766 ft., little oil at 770 ft. Oil at 805 ft. Salt water at 840 ft. Sandstone, "Salt Sand" 840 ft. to 848 ft. Williamsburg Oil Sand 766 ft. to 848 ft. Gas at 1,093 ft. More gas 1,100 ft. Well made 5 million cu. ft. of gas, 24 hours' open flow, 220 lbs. of rock pressure.

WELL LOG No. 27.

(PARTIAL RECORD)

John Foley, No. 1, lessor. The Kentucky Oil, Co. lessee. Location: Near Williamsburg, Whitley County, Ky. Drilled: Jan. 1917. Manager: H. H. Cripler.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, coal, shale	725	725
Sandstone, Williamsburg oil sand	160	885
Sandstone	40	925
Total depth		925

725 ft. 6⅝″ casing and joint drive pipe 8¼″. Top of Williamsburg Oil Sand 885 ft. Well driven about 125 ft. above river bottom.

WELL LOG No. 28.

B. H. Taylor, No. 1, lessor. Iroquois Oil & Gas Co., lessee. Location: About ¾ mile N. W. of Williamsburg. Drilled in 1923. Driller: E. C. Disel.

Strata	Thickness	Depth
RECENT		
Clay	2	2
PENNSYLVANIAN SYSTEM		
Sandstone, hard, shelly	23	25
Shale	225	250
Sandstone, white	275	525
Coal	5	530
Sandstone, white	178	708
Sandstone, gray	80	788
Shale, shells	118	906
Sandstone, white	110	1016
Shale	57	1073
MISSISSIPPIAN SYSTEM		
Limestone, white	12	1085
Shale	25	1110
Limestone	52	1162
Shale (caved considerably)	10	1172
Limestone, broken	28	1200
Limestone, soft	25	1225
Limestone	68	1293
Limestone	9	1302
Total depth		1302

19 ft. drive pipe 2 ft. Cased 6¼″ at 708 ft. Williamsburg Oil Sand 906 ft. to 1,016 ft. Show oil at 908 ft. Second oil show at 1022 ft. Gas at 1293 ft. Set 4⅞″ liner from 1,032 ft. to 1,240 ft. to shut off cave and finished well with 4⅞″ hole.

WELL LOG No. 29.

(PARTIAL RECORD)

G. W. Rains, No. 1, lessor. Kentucky Oil Co., lessee. Location: Near Williamsburg, Whitley County, Ky. Manager: H. H. Cripler.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	754	754
Sandstone "oil sand"	70	824
Shale	61	885
Sandstone	60	945
Shale	15	960
MISSISSIPPIAN SYSTEM		
Limestone	10	970
Shale, hard, pink	35	1005
Limestone	20	1025
Shale	5	1030
Limestone	30	1060
Shale	30	1090
Limestone, blue	15	1105
Shale	55	1160
Limestone, white	365	1525
Limestone	5	1530

6¼" casing at 745 ft. Gas at 1,302 ft., about 250,000 cu. ft.

WELL LOG No. 30.

Log of well drilled by T. J. Langdon on the Mount Morgan Coal Company farm, near Williamsburg, Ky., Whitley county. Commenced: Feb. 2, 1923. Completed: March 5, 1923.

Strata	Thickness	Depth
RECENT		
Soil	28	28
PENNSYLVANIAN SYSTEM		
Shale	22	50
Sandstone	25	75
Shale	35	110
Sandstone	40	150
Shale	50	200
Sandstone	25	225
Shale	25	250
Sandstone	50	300
Shale	150	450
Sandstone	190	640
Shale	1	641
Sandstone	374	1015
Shale	85	1100

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone	215	1315
Shale	5	1320
MISSISSIPPIAN SYSTEM		
Limestone	15	1335
Limestone	49	1384
Shale	14	1398
Limestone	42	1440
Shale	5	1445
Limestone	55	1500
Sandstone	15	1515
Limestone	55	1570
Sandstone	5	1575
Limestone	105	1680
Shale	5	1685
Sandstone, hard	17	1702
Total depth		1702

Note: Cased 8¼ at 41 feet, and 6⅝ at 828 feet.

WELL LOG No. 31.

John M. Taylor, No. 1, lessor. Piney Oil and Gas Co., lessee. Location: ¾ of a mile west of Williamsburg, Whitley county, Ky. Commenced: Dec. 1, 1922. Completed: Mar. 5, 1923. Ensslin & Ensslin, Drillers.

Strata	Thickness	Depth
RECENT		
Soil	1	1
PENNSYLVANIAN SYSTEM		
Shale, sandstone, shelly limestone	74	75
Coal	2	77
Shale, sandstone, lime shells	41	118
Sandstone "Water sand"	22	140
Shale	95	235
Sandstone	160	395
Coal	3	398
Sandstone	184	582
Shale	23	605
Sandstone, oil show 672 ft.	72	677
Shale	57	734
Sandstone	47	781
Shale	118	899
Sandstone	12	911
Shale	13	924
Sandstone, oil show 929	10	934

MISSISSIPPIAN SYSTEM		
Limestone	7	941
Shale, "Red Rock"	4	945
Shale	3	948
Limestone	33	981
Shale, shelly limestone	36	1017
Shale, pink	35	1052
Shale, shelly limestone	35	1087
Limestone, black	28	1115
Shale	5	1120
Limestone, black	50	1170
Shale	5	1175
Limestone, broken	5	1180
Limestone	26	1206
Shale, cavey	11	1217
Limestone	15	1232
Shale, "Pencil Cave"	3	1235
Limestone	215	1450
Total depth		1450

Note: Gas pay from 1,372 to 1,376. Water at 140 feet. Set 30 joints 6⅝ casing, 605-677; total casing 599 feet.

WELL LOG No. 32.

E. S. Moss, No. 1, lessor. Whitley Oil and Gas Co., lessee. 1902. Secondary lessee: Iroquois Oil and Gas Co. Location: Just below L. & N. R. R. bridge on North bank of Cumberland River, ½ mile from Williamsburg, Whitley county, Ky.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	425	425
Sandstone	25	450
Sandstone	316	766
Sandstone "Oil Sand"	53	819
Shale, hard, and shells	81	1000
MISSISSIPPIAN SYSTEM		
Limestone	55	1055
Shale	5	1060
Limestone "Gas sand"	33	1093
Limestone	7	1100

Drilled to 435 by 1st lessee, 1902, and oil flowed from 8″ hole without being cased. Iroquois Oil Co. drilled to Williamsburg oil sand and shot in Williamsburg oil sand, then later drilled to Williamsburg gas sand, Dec., 1920.

6¼″ casing 585 ft. Gas 1,093-1,095 ft. Well made 4 million.

WELL LOG No. 33.

(PARTIAL RECORD)

E. S. Moss, No. 2, lessor. Iroquois Oil and Gas Co. Lessee. Location: On bluff about 125 ft. above river bottom about 1¼ miles north of town across Cumberland River from well No. 4, on the Steely farm. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	885	885
Sandstone "Oil sand"	25	910
Sandstone	25	935
Total depth		935

8¼″ drive pipe 35 ft. 6¼″ casing 715 ft. First oil at 892 ft. Second oil at 904 ft. to 910 ft.

WELL LOG No. 34.

C. A. Moss No. 1, lessor. Iroquois Oil & Gas Co., original lessee; Esmaeldra Oil Co., secondary lessee. Location: 3½ acres on river bluff, about 1¼ miles north of Williamsburg, about 125 ft. above river bottom, Whitley County, Ky. Commenced: March 9, 1917. Completed: April 18, 1917, in pink shale. Recommenced drilling June 1917. E. C. Disel drilled into gas sand for Esmaeldra Oil Co.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	250	250
Sandstone, white	260	510
Coal	5	515
Sandstone	200	715
Sandstone	175	890
Sandstone, "Oil sand"	28	918
MISSISSIPPIAN SYSTEM		
Shale, pink	9	927
Sandstone and shale	193	1120
Limestone "Gas sand"	219	1339
Limestone "Gas sand"	93	1432

8¼″ casing drive pipe. 6¼″ casing 715 ft. Gas at 1,339 ft. about 50,000 cu. ft. Some oil.

WELL LOG No. 35.

(PARTIAL RECORD)

E. S. Moss No. 1, lessor. lessee. Location: On bluff across the river from the Steely farm, about 1½ miles north of Williamsburg, Whitley Co., Ky. Drilled by R. H. Parker, and Harlie

Burkett, Findlay, Ohio. Completed: Jan. 1, 1908. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	894	894
Sandstone "Oil Sand"	35	929
Shale	11	940
Total depth		940

8¼" drive pipe 30 ft. 6¼" casing 715 ft. Williamsburg oil sand 894 to 929 ft. Well made 35 bbls. of oil first 18 hours.

WELL LOG No. 36.

(PARTIAL RECORD)

Rhoda Siler, No. 1, lessor. Cumberland Bend Oil & Gas Co. Location: Just across Cumberland River from the mouth of Clear Fork River on river bottom, Whitley County, Ky. Driller: James Laughton.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	705	705
Sandstone "Oil sand"	56	761
Sandstone and shale	359	1120
MISSISSIPPIAN SYSTEM		
Limestone, sandstone, gas	280	1400
Total depth		1400

6¼" casing at 685 ft. Gas at 1,387 ft.

WELL LOG No. 37.

(PARTIAL RECORD)

C. A. Moss, No. 1, lessor. Farm No. 1, Southeastern Oil Co., lessee. Location: About 2 miles S. W. of Williamsburg, Whitley Co., Ky., near where the carbon plant is now located. Contractor: H. A. Greenlee. Manager: E. C. Disel.

Strata	Thickness	Depth
RECENT		
Soil, sand and gravel (drive pipe)	42	43
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	743	885
Sandstone, "Oil sand"	40	925

This is about 20 feet above river bottom. 8¼" drive pipe 42 ft.

WELL LOG No. 38.

(PARTIAL RECORD)

E. S. Moss, No. 2, lessor. Whitley Oil Co., lessee. (Secondary lessee, Iroquois Oil and Gas Co.) Drilled in 1902 by first lessee, and 1920 by last lessee. Authority: E. C. Disel.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	800	800
Sandstone, shale	200	1000
MISSISSIPPIAN SYSTEM		
Limestone "gas sand"	196	1196

6¼" casing 435 ft. 4⅞" 565 ft. 4⅞" 800 to 1,196 ft. Gas at 1,183 ft., about 500,000 cu. ft. with 275 lbs. of rock pressure.

WELL LOG No. 39.

(PARTIAL RECORD)

Joe King, No. 1, lessor. Whitley County Oil Co., lessee. Location: About 1½ miles north of Williamsburg, Whitley county, Ky. Drilled by E. C. Disel, with standard big well about 120 feet above river bottom. Commenced: Dec. 5, 1916. Completed: Jan. 5, 1917.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale, coal	250	250
Sandstone, white	260	510
Coal	5	515
Sandstone and shale	235	750
Coal	2	752
Sandstone and shale	148	900
Sandstone "oil sand"	37	937
Limestone	13	950
Total depth		950

8¾" drive pipe 32 ft. 6¼" casing 722 ft. Williamsburg Oil Sand 900 to 937 ft. Little oil and gas at 950 ft.

WELL LOG No. 40.

R. N. Adkins, No. 1, lessor. Location: 1½ miles S. W. Williamsburg, on 1st right-hand branch of Briar Creek, Whitley County, Ky. Production: Gas. Completed: 1920. Casing head elevation: 1042 A. T. Structural position: Nose of anticline, south flank near crest. Authority: C. E. Disel, Williamsburg, Ky.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	5	5
Sandstone	85	90

Strata	Thickness	Depth
PENNSLYVANIAN SYSTEM		
Shale	175	265
Sandstone	162	427
Shale and coal	3	430
Sandstone	163	593
Shale (cased 600 6¼" casing)	32	625
Sandstone	115	740
Shale	10	750
Sandstone	55	805
Shale (coal due at 809)	60	865
Sandstone	35	900
Shale	23	923
Sandstone (oil)	20	943
Sandstone, broken	22	965
Shale	13	978
MISSISSIPPIAN SYSTEM		
Shale, pink (Mauch Chunk)	72	1050
Shale	50	1100
Limestone	10	1110
Shale	45	1155
Limestone (Big Lime)	25	1180
Shale	5	1185
Limestone (Big Lime)	40	1225
Shale	5	1230
Limestone (gas 1365)	135	1365
Limestone (more gas at 1370)	19	1384
Total depth		1384

RECAPITULATION OF SELECTED LIST OF WELL RECORDS OF WHITLEY CO., KY.

Lessor	Location	Depth
(1) J. P. Sharp	Rockhold Station	2230
(2) Williamsburg Water Co.	Williamsburg	128
(3) Perkins	Williamsburg	375
(4) Nelson No. 1	1½ mi. S. E. Williamsburg	826½
(5) Nelson No. 2	Williamsburg(?)	871
(6) Electric Light Co. (partial record)	Williamsburg	826
(7) Sutton	1 mi. S. W. Willamsburg	975
(8) G. W. Rains (partial R.)	Near Williamsburg	1381
(9) G. W. Rains No. 3	½ mi. S. E. Williamsburg	1532½
(10) Steely No. 2	1 mi. N. Williamsburg	862

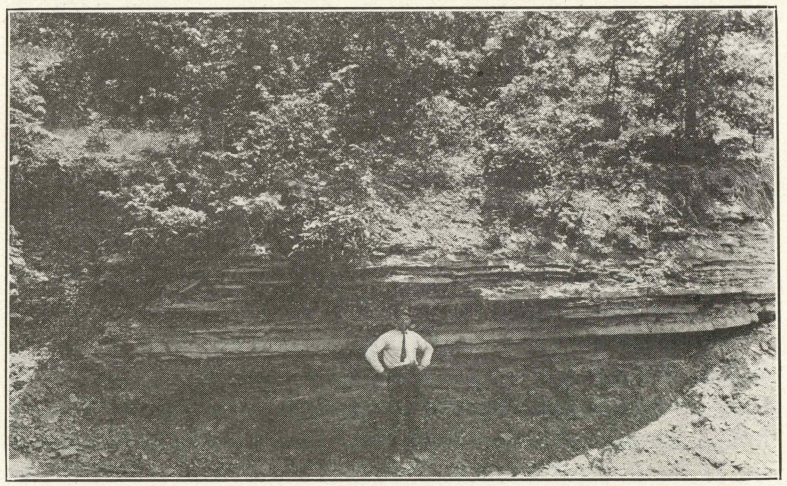
RECAPITULATION OF SELECTED LIST OF WELL RECORDS OF WHITLEY COUNTY, KY.—Continued.

Lessor	Location	Depth
(11) Steely No. 4	1 mi. N. Williamsburg	800
(12) Steely No. 5	1 mi. N. Williamsburg	804
(13) Steely No. 8	1 mi. N. Williamsburg	2170
(14) Unknown	Mouth of Clear Fork	1530
(15) S. M. Brown No. 1		1820
(16) John Foley No. 1	¾ mi. W. Williamsburg	3350
(17) Rose No. 1	1½ mi. W. Williamsburg	1305
(18) Bapt. Educa. Soc. No. 1	1 mi. N. Dog Slaughter Ck.	1580
(19) H. M. Young No. 1	13 mi. N. W. Williamsburg	1201
(20) R. N. Adkins No. 1	1½ mi. S. W. Williamsburg	1384
(21) Unknown	½ mi. S. E. Saxton	1616

NOTE.—About 40-45 wells have been drilled in Whitley County, the records of many of which are not available.

Structural Geology

The principal structural feature of this region is the Williamsburg anticline. It adjoins on the southeast the lowest structural region in the eastern Kentucky coal basin—the eastern Kentucky geo-syncline. The Williamsburg anticline thus exhibits

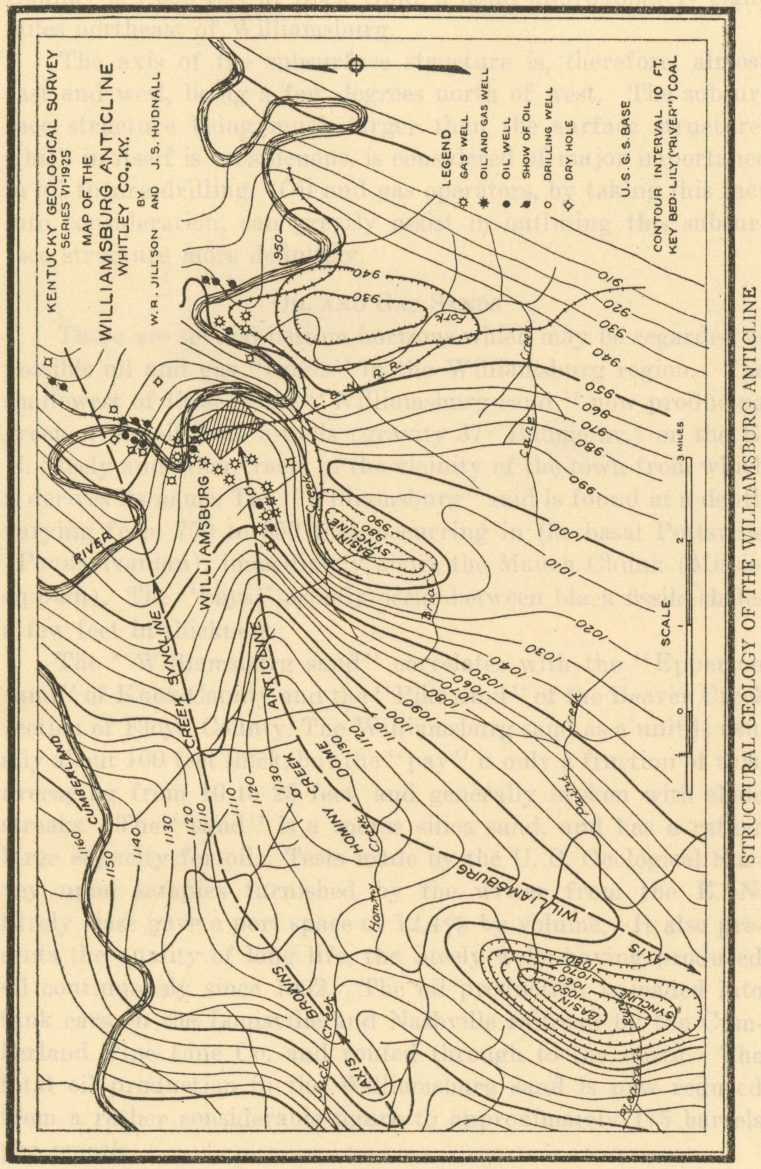


NORTH FLANK WILLIAMSBURG ANTICLINE
This outcrop of sandy Pottsville shales is on the Nicholson Hill road below Williamsburg. The dip is about 3 degrees to the northeast.

a rather thick sequence in the lower Pottsville. Though both the eastern Kentucky geo-syncline and the Williamsburg anticline have a northeast-southwest trend, they are not regarded as complementary structures or of similar time origin. Elevations placed on the Lily coal show the Williamsburg anticline to be a doming structure rising to elevations of about 1,130 feet (Lily Coal) in the Hominy Dome on the headwaters of Hominy Creek, Beck's Creek and Rough Shoal Branch on the north and west, and Briar and Paint Creeks on the south and east. The main anticlinal structure plunges rapidly to the east, and elevations varying from 970 to 1,110 feet are common in the vicinity of Williamsburg townsite. A plunging syncline, here designated as the Brown's Creek syncline exhibiting elevations ranging from 1,020 to 1,120 feet (Lily Coal) bound the Williamsburg anticline on the north. The eastern Kentucky geo-syncline may be regarded as the structural boundary on the south and southeast.

An examination of the Williamsburg anticline reveals two pronounced terraces and one dome, the latter of which has already been referred to. The lowest of these terraces occurs just east of the Cumberland river, and the uppermost of the terraces occurs just west of the Cumberland river underneath the town of Williamsburg. These features are indicated on the structural map, scale 1 inch equals one mile, keybed the Lily coal which has been executed for this region. A copy of this structural oil and gas map is included within this volume as a part of this report.

An investigation of the transverse axial figure of the subsurface structure of the region reveals the fact that there is a much larger and older anticline present in the sediments of Mississippian age than the one which is seen at the surface in the Pottsville series. In other words, the Mississippian rocks below Williamsburg are folded into a very pronounced anticline, which may have taken the form of a low island during the Mauch Chunk period. The Pennsylvanian sediments which are deposited on the top and flanks of this island are much thinner than those set down more remotely to the north and south of Williamsburg. Thus the distance from the Lily coal (Pottsville) to the top of the red rock (Mauch Chunk) is 893 feet, on the top of the Williamsburg anticline, while the same interval is 1,100 feet at Saxton, ten miles of Williamsburg. The same interval be-



STRUCTURAL GEOLOGY OF THE WILLIAMSBURG ANTICLINE

tween the Lily coal (Pottsville) and the red rock (Mauch Chunk) is 1,000 feet at Rock Hold, a point approximately eight miles northeast of Williamsburg.

The axis of the subsurface structure is, therefore, almost east and west, being a few degrees north of west. The subsurface structure being much larger than the surface structure, which in itself is conspicuous, is considered of major importance in all future drilling. Oil and gas operators, by taking this fact into consideration, can greatly assist in outlining this subsurface structure more definitely.

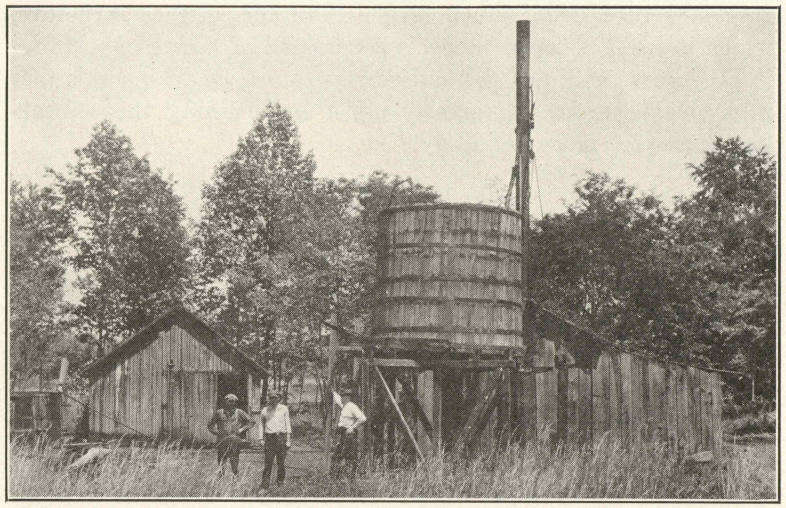
Oil and Gas Sands

There are several bottom horizons which may be regarded as possible oil and gas "sands" in the Williamsburg region. The shallowest of these is the "Williamsburg sand," now producing green crude oil from 5 wells (gravity 37° Baume av.) on the E. N. Steely and other tracts in the vicinity of the town from which it derives its name. The "Williamsburg" said is found at a depth varying from 750 to 850 feet, occurring in the basal Pottsville (Pennsylvanian), immediately above the Mauch Chunk (Mississippian). The "pays" usually occur between black fissile shales a few feet in thickness.

The "Williamsburg sand" correlates with the "Epperson sand" of Knox County and the "Pike sand" of the Beaver Creek section of Floyd County. The Williamsburg sand as a unit is usually about 100 feet thick, but the "pay" is only a fraction of this, averaging from 10 to 25 feet, and generally broken with shale streaks. The "sand" is a coarse silica sand, and has a rather large capacity for oil. Tests made by the U. S. Geological Survey upon samples furnished by the writer from the E. N. Steely lease gave a port space of 12.4% by volume. It also presents the quality of long life, the Steely wells having produced oil continuously since 1902. The oil production is loaded into tank cars on the Louisville and Nashville railroad by the Cumberland Pipe Line Co. and routed through to the north. The total oil production in the Williamsburg sand is now reduced from a rather considerable figure to approximately 175 barrels per month.

In the wells which have been drilled in the vicinity of Williamsburg, the "Maxon" sand (Mauch Chunk) is not recognized as an oil and gas producer of commercial importance. The

Maxon is sometimes present in the record, but quite often it is missing. In spite of this fact, about thirty-five miles northwest of Williamsburg, where it outcrops, it is frequently well developed, and prompts the suggestion that somewhere in this



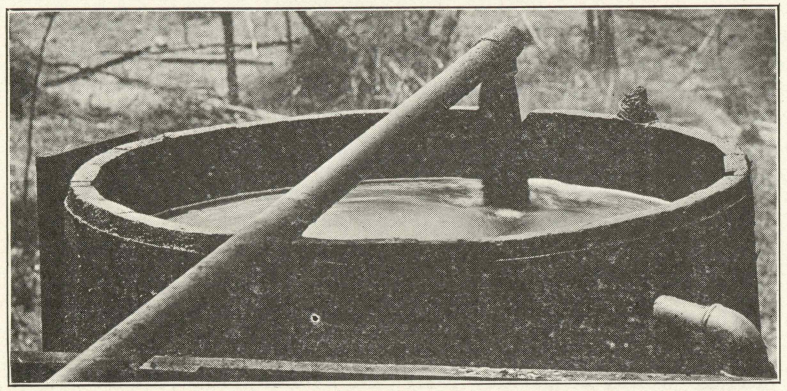
Pump House Steely Lease.

region it may some time be found to be an important oil "sand." The "Maxton sand" is well developed where it is brought up by the Pine Mountain fault near High Cliff, Tennessee, twelve miles southeast of Williamsburg, and may, therefore, be expected to occur at least on the outer flanks of the Williamsburg anticline, in which location it should be anticipated by the driller. It is an oil and gas producer of importance in the Barbourville (Knox County) and Beaver Creek (Floyd County) oil and gas fields a few miles to the northeast. It may be regarded as a distinct possibility in this field.

The next lower oil and gas producing formation definitely recognized in the Williamsburg vicinity is the "Big Lime" (Chester), which has been developed to a considerable extent in this vicinity. It has been pierced by more than a dozen wells. The "Big Lime" generally shows gas when drilled through on structural positions, and 9 wells are now producing a conservative 12,000,000 cubic feet daily open flow. Three of these, (1) the W. S. Siler No. 1, (2) the R. N. Adkins No. 1 and (3) the J.

K. Rose No. 1, produced over 3,500,000 cubit feet per day open flow apiece when first gauged.

A comparison of these larger gasers with others of very moderate production and occasional dry holes essentially in off-



Settling Tank Steely Lease.

set, leads to the conclusion that this calcareous formation is shot with joint planes—the "crevaces" of drillers. There subsurface fissures probably developed into a well defined geometrical pattern, are undoubtedly intercommunicating and widely ramifying. Thus conceived, they would form an almost ideal gas reservoir, though which under certain fortuitous circumstances of drilling might be rather easily and quickly exhausted. Evaluated on a basis of its known gas production the "Big Lime" is considered the most important prospective "gas sand" in this region. In lower structural positions, it may also be an oil possibility, as petroleum is now being produced from it in paying quantities 30 miles to the northwest of Williamsburg in eastern Pulaski County, Ky.

There occurs in the Waverly series below the "Big Lime" a sandstone, which is possibly a correlative of the "Big Injun sand." This sand has shown gas in a few wells, and is worthy of consideration by operators, though it is not shown to be a producer of petroleum in this region. It should be encountered at a depth of approximately 1,500 feet. The Beaver sand (New Providence-Mississippian), productive of both oil and gas in

Wayne County, 35 miles west of Williamsburg, is not recognized by drillers in this Whitley County field.

Dropping stratigraphically below the Chattanooga (Devonian) black shale which is about 150 feet thick in this region, the Corniferous limestone (Devonian) is encountered. This is the large oil producer of the Estill-Lee-Powell-Wolfe region. It is not regarded as a commercial oil and gas possibility in this field because of its extreme depth—about 1950 feet. Beneath it in succession will be found the Niagaran (Silurian), which is also known to produce at a number of points in eastern Kentucky, the "Sunny Brook" (Cincinnatian) and the "Trenton" (Mohawkian). These three deep "sands" are not regarded as of commercial importance in this field, the opinion being based upon drilling experience elsewhere in Kentucky at this depth. In the vicinity of Williamsburg, it may be logically inferred that regional metamorphism at a depth of 2,000-3,000 feet below the surface would be greatly increased as compared to that found in the shallow sands, due to the close proximity of the Pine Mountain over-thrust fault.

The principal unrecovered oil body of the Williamsburg field is thought to occur in the "Williamsburg sand." The "Big Lime" gas sand underlying is also considered important, with the distinct possibility of securing production from the "Maxton sand" and "Big Injun sand" in some places yet undrilled. From the standpoint of present knowledge, the "Williamsburg sand" and the "Big Lime sands" will be the principal oil and gas producers.

Oil and Gas Development

Drilling in the Williamsburg field has been sporadic since the first well, the E. S. Moss No. 1, was drilled to a depth of 425 feet on the Cumberland river just north of Williamsburg in 1902 by the Whitley Crude Oil Company, a local development company. This well produced oil and flowed with a flush production reported to have been between ten and fifteen barrels natural. Following this strike, eight additional wells were drilled by the Cumberland Bend Oil Company in 1902 on the E. N. Steely and adjoining farms north of Williamsburg and west of the river, oil production having been secured from the "Williamsburg sand." These wells started in with natural production ranging

from two to five barrels. When shot, they produced between thirty-five and fifty barrels each. A characteristic analysis of oil taken from the Steely lease by the writer is given herewith.

PETROLEUM ANALYSIS

Laboratory No. G-4077—Petroleum, labeled "Sample: Green crude oil (fresh pumped). Lessor: E. N. Steely. Lessee: Iroquois Oil & Gas Co. Locality: 1 mi. N. of Williamsburg, Whitley Co., Ky. Horizon: Williamsburg sand (Pottsville). Coll. W. R. Jilson, State Geoogist. Date: 5-10-22." Sample, a fairly thin, green oil; dark brown by transmitted light. Contains some sediment, all of which did not settle. Received from W. R. Jillson, May 12, 1922.

ANALYSIS

Specific gravity 0.8505, equivalent to 34.6° B.

	Per Cent by Volume
Distilled below 150° C. (302° F.), gasoline fraction	16.3
Distilled 150 to 300° C. (302-572°F.), kerosine fraction	32.6
Green-brown tar	49.8
Water	0.4
Loss	0.9
Total	100.0
Sulfur	

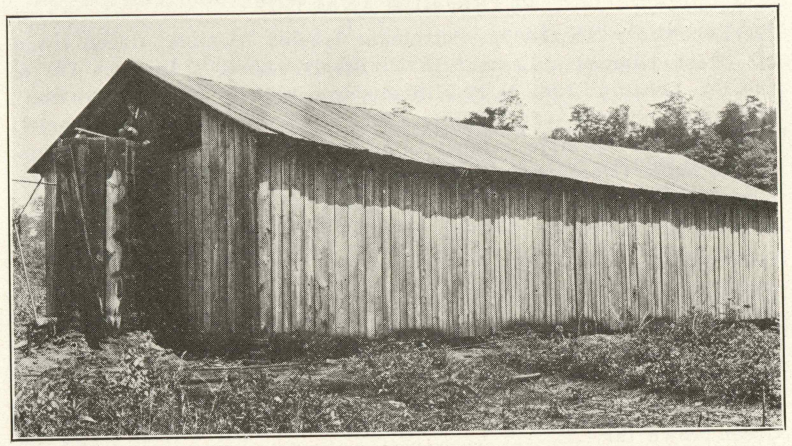
Began to distill at 55° C. (131° F.)

ALFRED M. PETER, Chief Chemist

(Analysis by A. M. Peter.)
Lexington, Ky., June 7, 1922.

Various other wildcat wells were drilled by a number of small companies in 1903 and 1904. The Joe Sutton well was drilled in 1903. In 1912 the Disel Oil and Gas Company took over the properties of the Cumberland Bend Oil and Gas Company and continued development. The E. S. Moss and C. A. Moss farms on the bluff were drilled in 1916 by the Whitley Crude Oil Company. In 1917 the Kentucky Oil Company secured and drilled the George Risner lease. In 1917 the Esmeralda Oil Company drilled the C. A. Moss to the line and got 150,000 cubic feet of gas. In 1919 the Iroquois Oil and Gas Company took over the Disel Oil and Gas Company, which at that time controlled the Steely production, and drilled six gas wells, which are now supplying Williamsburg with natural gas.

One or two other gas wells were drilled in by drilling deeper old shallow wells. In 1921, the Whitley Crude Oil Company started drilling the Joe Hamlin No. 1, at the head of Beck's Creek, on top of the Hominy Creek Dome on the Williamsburg



Tank House Steely Lease.

anticline. This company ran out of funds and, apparently unmindful of the important structual position they occupied, stopped drilling at a depth of 835 feet, about 130 feet above the sand. At the present time there are no other wells being drilled in this field.

NATURAL GAS PRODUCTION—SELECTED WELLS

G. W. Rains farm No. 2, drilled in 1917. Gas at 1,369 ft. Drilled to 1,381 ft. Gauged two million cubic feet. Gauged in 1921, 134,000 cubic feet. Two other small gas wells on this farm.

R. N. Adkins well drilled in April, 1920. Gas at 1,365 feet. Drilled to 1,380 feet. Gauged 3,500,000 cubic feet. In fall of 1921, gauged 2,952,480 cubic feet. Rock pressure 240 lbs.

J. K. Rose well drilled in July, 1920. Gas at 1,265 feet. Drilled to 1,305 feet. Gauged 3,500,000 cubic feet. In fall of 1921 gauged 3,000,000 cubic feet. Rock pressure 240 lbs.

E. S. Moss well No. 2, below railroad bridge. Drilled in October, 1920. Gas at 1,183 feet. Drilled to 1,196 feet. Gauged 500,000 cubic feet. Gauged in 1921, 500,000 cubic feet. Rock pressure 225 lbs.

E. S. Moss well below railroad bridge. Drilled in December, 1920. Gas at 1,093 feet. Drilled to 1,100 feet. Gauged 3,500,000 cu. ft. Gauged in 1921, 3,000,000 cubic feet. Rock pressure 225 lbs.

W. B. Siler or Electric Light Co., Well No. 2. Drilled in spring of 1921. Gas at 1,093 feet. Drilled to 1,100 feet. Gauged 4,000,000 cubic feet. Gauged in fall of 1921, 3,500,000 cubic feet. Rock pressure 230 lbs.

OIL PRODUCTION

Complete data covering amount of oil produced in Whitley County for the time the field was opened are not available. The following figures based upon runs of the Cumberland Pipe Line Co. are accurate and outline the latter period of development and operation principally by the Iroquois Oil and Gas Co.

1919	Bbls.	Value
August	148.09	$399.84
September	149.68	404.14
October	.....	.....*
November	149.61	426.39
December	142.01	461.53
	589.39	$1,691.90

1920	Bbls.	Value
January	.....	.....
February	146.31	$548.66
March	144.60	542.25
April	142.12	568.48
May	140.55	562.20
June	112.82	451.28
July	.....	.....
August	140.37	561.48
September	148.39	630.65
October	.....	.....
November	145.70	619.23
December	.....	.....
	1,120.86	$4,484.23

1921	Bbls.	Value
January	137.60	$309.80
February	140.23	231.38
March	.....	.....
April	150.00	292.50
May	141.37	226.14
June	140.26	126.23
July	150.05	135.05
August	149.82	164.80
September	.....	.....

*Dotted lines indicate no oil runs.

1921	Bbls.	Value
October	.....	.....
November	.....	.....
December	293.84	558.30
	1,303.17	$2,044.20

1922	Bbls.	Value
January	.....	.....
February	.....	.....
March	.....	.....
April	.....	.....
May	149.75	$321.96
June	.....	.....
July	.....	.....
August	.....	.....
September	115.50	190.58
October	.....	.....
November	.....	.....
December	.....	.....
Total	265.25	$512.54

	Bbls.	Value
1919	589.39	$1,691.90
1920	1,120.86	4,484.23
1921	1.303.17	2,044.20
1922	265.25	512.54
Grand total from Aug., 1919 to Sept., 1922, inclusive	3,278.67	$8,732.87

Oil and Gas Possibilities

Based upon a delineation of the surface and subsurface structures, and the present and past production of the field, petroleum and natural gas are regarded as occurring in commercial quality and quantity in the "sands" already outlined beneath the Williamsburg anticline. Oil production is regarded as a certainty in the "Williamsburg sand" at a depth of about 800 or 850 feet, depending upon the surface altitude and location of the well. The best oil production is anticipated along the crest of the subsurface (Mississippian) anticline. Drilling positions to the west of present production are recommended for initial testing purposes.

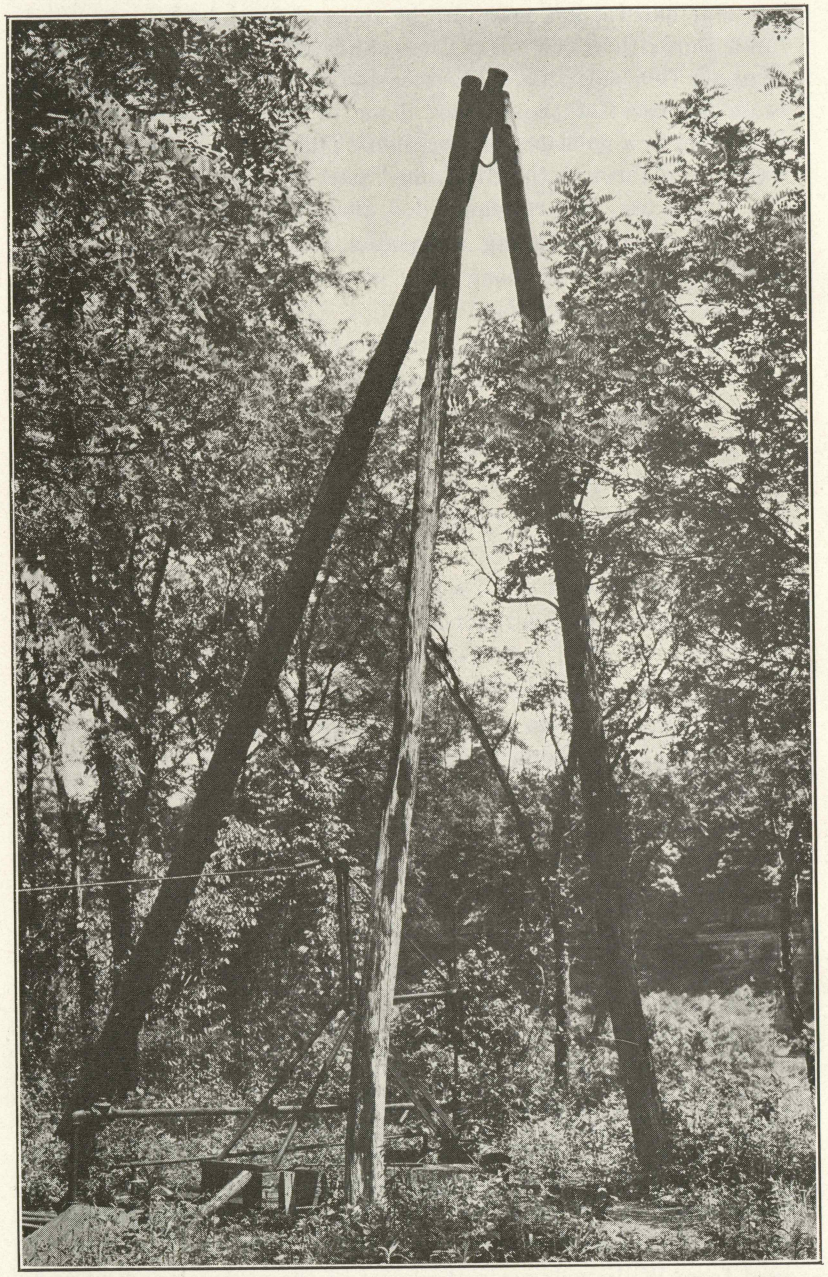
In the "Big Lime sand" the Williamsburg anticline is regarded as a gas producer of possibly gigantic size. It is pointed

out that natural gas may also be secured from both higher and lower sands than the "Big Lime sand" at high structural positions on this anticline. The location of the Joe Hamlin No. 1 is on the crest of the surface dome of the Williamsburg anticline, and is a good testing location This well should be drilled deeper and through the Big Lime "pay."

Other tests are recommended along the crest of the surface anticline, and also along a parallel line about a mile to the northwest, extending along what is regarded as the crest of the subsurface (Mississippian) anticline. The present gas production of the Williamsburg field totals about 12,000 feet open flow, and this is regarded as simply an index to the very much larger open flow which could be secured in this field. Rock pressure varies from 150 to 280 pounds. For further natural gas details concerning this region the reader is referred to pages 50 and 51 of " The Conservation of Natural Gas in Kentucky," 1922, by the writer.

An examination of 15 separate analyses of the coals of the Williamsburg area, all commercial seams being represented, shows that the fuel ratio is about 1.4 or 60% of fixed carbon, thus indicating that the regional metamorphosis, while high, has not been sufficient to preclude the possibility of commercial quantities of petroleum in the shallow sands, the occurrence of the faulted Pine Mountain slightly to the south notwithstanding. If additional proof were desired, the fact that commercial oil has been produced from the Steely wells at Williamsburg for 20 years would seem to set the question aside definitely.

While a number of tests located with geological precision will be required to fully outline the Williamsburg field, in planning such comprehensive development, it is certain that oil in commercial quantities, and large supplies of natural gas can be secured at depths ranging from 800 to 1,500 feet. These are regarded as mediumly shallow for the eastern coal field of Kentucky. Thus delineated the Williamsburg region is regarded as worthy of further prospecting for oil and gas. The convenience of the main line of the Louisville and Nashville railroad bisecting this region, coupled with an excellent graded road from Williamsburg to the heart of the undeveloped oil and



STEELY NO. 5 WELL ON PUMP
This well and lease is owned and operated by the Iroquois Oil and Gas Co.

gas leases of the Jellico Creek region, will lower the cost of development and facilitate its completion.

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A discussion of the sands found, their depths; well logs.

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"Pay Oil Sands of Eastern Kentucky" in contributions to Kentucky Geology. Ky. Geol. Survey, Series V, Bull. IV, 1920, pp. 189, 222.
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"The Production of Kentucky Crude Oil" in Economic Papers on Kentucky Geology. Ky. Geol. Survey. Series VI, Vol. II, pp. 71-115.
Gives oil production figures for Whitley County, years 1918, 1919, 1920 and a part of 1921.

1922

Jillson, W. R.

Conservation of Natural Gas in Kentucky. John P. Morton Co., Louisville, Kentucky, pp. 50 and 51.

Brief statement of occurrence of Williamsburg Anticline, regional geology and oil and gas production.

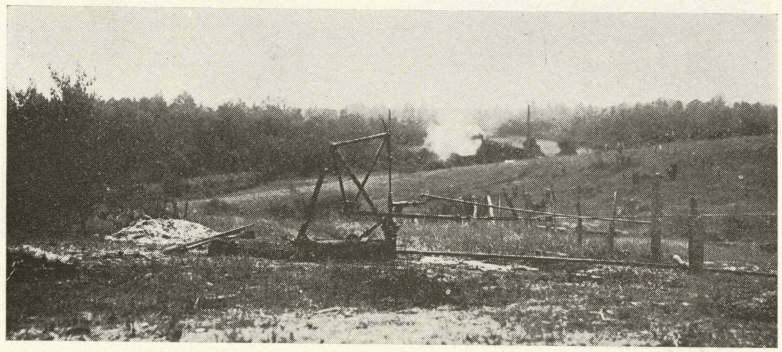
Oil Field Stratigraphy of Kentucky. Ky. Geol. Survey, Series VI, Vol. III, pp. 705-716. Gives numerous well logs of Williamsburg region many of which are reproduced here.

Manuscript written Sept., 1922.
Revised August, 1925.

III.

RESUMÉ OF KENTUCKY'S MINERAL RESOURCES*

Second in figure only to the total value of its agriculture, the producing mineral resources of Kentucky are the most important and valuable material asset of the state. Despite this fact, the citizen and his elected representatives have been slow



PRODUCING PETROLEUM IN WESTERN KENTUCKY

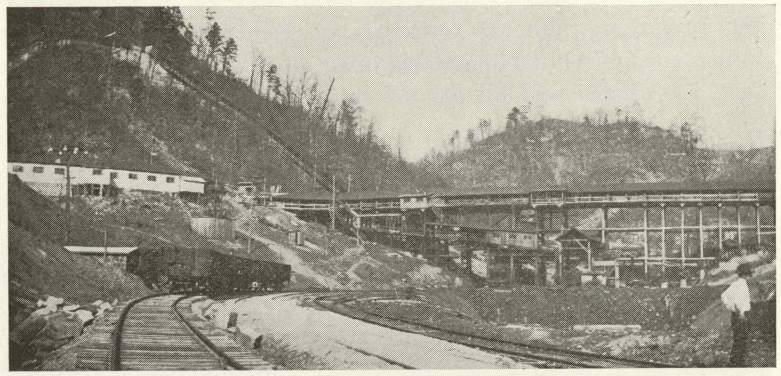
One of the important new oil fields of this State is located near Pellville in Hancock, Ohio and Daviess Counties. This view shows one "pumper" and a drilling on the S. V. Flowers lease in the Pellville pool in Ohio County.

to take advantage of the many advantages afforded by nature. Though oil was found by drilling processes in southern Kentucky over 100 years ago, and coal has been definitely known to occur in this state since 1750, no attempt to develop these and other associated minerals in Kentucky was launched on a broad scale until about 1890.

Within recent years the development of oil, gas, coal, fluorspar and rock asphalt has proceeded by leaps and bounds, and has given a very great impetus to industry and prosperity throughout this state. Other minerals have been developed less rapidly. In 1916 Kentucky produced 1,144,750 barrels of crude oil, and this production increased in 1917 to over 3,000,000 barrels. In 1918 another million barrels were added, which increased the total value of the crude oil to $8,906,422.00. In 1919

[1] Presented before the Kentucky Educational Association Louisville Male High School, Tuesday, January 16, 1923. Revised September, 1925.

the apex of the volume of oil produced in Kentucky was reached, when 9,226,473 barrels valued at $24,459,017.00 was produced. In 1920 the production of crude oil, due to a slump in price decreased to about 8½ million barrels. In 1921, Kentucky oil



HAZARD COAL FIELD, EASTERN KENTUCKY
This is a typical scene in the Eastern Coal Field. Many operations like this one of the Harvey-Jellico Coal Co. on the head of First Creek in Perry County make use of the double tipple and drift mine two separated properties at the same time.

production increased to 9,080,845 barrels and this volume, coupled with the mounting price of crude oil made 1921 the banner year for value—$33,556,241.00, being the gross return to oil operators in the state of Kentucky. In 1922 the production of petroleum decreased to 8,889,303 barrels valued at $17,532,766. Production slightly decreased to 8,087,250 barrels valued at $15,189,916 in 1923. The past year, 1924, witnessed a still further decrease in the volume of Kentucky oil, 7,437,232 barrels being produced valued at $14,418,982. With a depressed market, due to large production in the west, coupled with new refining methods, the immediate future for the oil industry in Kentucky appears to be unsettled and unattractive. Production will probably continue to decline.

The story of the coal development in this state is much similar, but the figures of value far exceed those of petroleum. In 1918 Kentucky produced 31,530,442 tons of coal which were valued at $94,591,326. The production in 1919 decreased about a million tons, but in 1920 increased to 38,892,044 tons valued at $159,457,380.00. In 1921, due to strikes and other causes

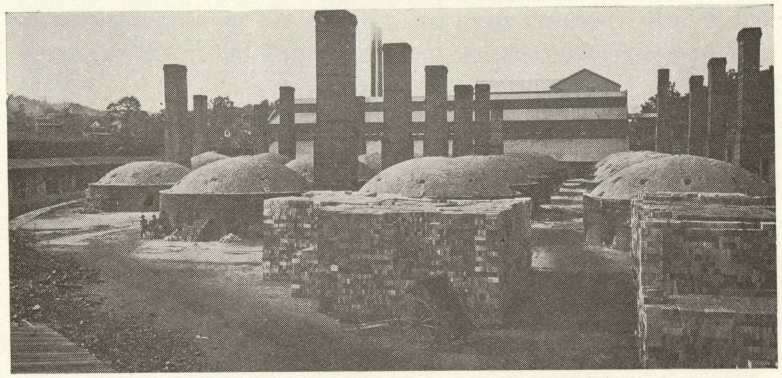
brought about by the depression, the production of coal in Kentucky dropped to 30,282,659 tons valued at $81,460,352.00. At this time there were 641 mines operating in the state of Kentucky, controlled by 525 companies, employing a total of 49,790 men. In the year 1922 there were produced 42,134,175 tons of coal, which increased in 1923 to 43,149,962 tons and again in 1924 to 43,387,732 tons,[1] a greater amount than ever before in Kentucky. The value of this large production, due to a continued weak market, was only $88,745,968.00 at the mines. Such a volume of production, however, has raised Kentucky from 5th to 4th place among the states producing coal in the United States. This state is now superseded only by Pennsylvania, first; West Virginia, second and Illinois, third.

During the past two years Kentucky's progress in coal development has been greatly handicapped by the general depression and reorganization effective in the industry throughout the country. In 1922 the nonunion fields of this state continued in full operation during the general bituminous strike and forced Kentucky during a portion of the year into first place among the coal producing states of the United States. This was indeed an unique, and not altogether unappreciated, national distinction. Further increases are anticipated for the coal industry in Kentucky, but these will undoubtedly be less rapid than during the past few years. Systemization, standardization and consolidation of mines resulting in more scientific operation with reduced overhead expenses seems to be the reasonable forecast for the immediate future.

The third mineral of great importance in Kentucky is fluorspar, a whitish or glassy-appearing mineral, principally found in Livingston, Crittenden and Caldwell Counties, in western Kentucky, and in Mercer, Woodford and Jessamine Counties in central Kentucky The western field in connection with the deposits just north of the Ohio river in Illinois at Rosiclare, has recently been determined to be the greatest fluorspar field in the eastern United States, possibly the Union. Inasmuch as this mineral is essential to the modern manufacturer of steel, glass, aluminum and hydrofluoric acid, its future is assured.

[1] Figures from State Department of Mines, Lexington, Kentucky.

In 1918, 87604 tons of fluorspar were produced in Kentucky. In 1919 this production, due to the stagnation in the steel industry, dropped to 33,928 tons. In 1920 it increased to 46,091 tons, and in 1922 again increased to 63,322 tons. In 1924 Ken-



AN IMPORTANT KENTUCKY INDUSTRY
View of the General Refractories Co. plant at Olive Hill, Carter County, Kentucky. The capacity of this plant is 100,000 bricks per day. Clays for pottery, brick and tile and fire-clays for fire bricks are of increasing value in Kentucky.

tucky fluorspar production dropped to 46,728 tons. The value of the 1918 production of fluorspar was $2,069,185.00. Other years have been in proportion. The total value of but three minerals, coal, petroleum and fluorspar, for the three years, 1918, 1919 and 1920, for which figures are complete, amounted to $401,251,701.00. This tremendous amount of wealth is a fair index of the importance of the developed and undeveloped minerals in Kentucky.

The rock asphalt industry as now developed in Kentucky began in 1916 and 1917 in Edmonson County on the Nolin river. Prior to this time a number of unsuccessful attempts to produce this material for road making purposes had been initiated and had failed. At the present time there are about six corporations and as many more in process of organization. It is estimated that the volume of production in 1924 was about 250,000 or 300,000 tons with a value of $1,800,000.00 to $2,300,000.00. The best deposits are confined to Edmonson, Grayson, Warren, Hardin and Breckinridge Counties, in western central Kentucky, though outcrops of undetermined commercial value have been noted

elsewhere. With a growing market, frequently under produced, the future for the rock asphalt industry in Kentucky appears to be very bright.

RECENT MINERAL VOLUMES AND VALUES

COAL PRODUCTION IN KENTUCKY.*

	Volume	Value
1921	30,282,659 tons	$81,460,352.00
1922	42,134.175 tons	127,037,000.00
1923	43,149,962 tons	113,542,000.00
1924	43,387,732 tons	88,745,968.00

OIL PRODUCTION IN KENTUCKY.†

	Volume	Value
1921	9,080,845 bbls.	$33,556,241.00
1922	8,889,303 bbls.	17,532,766.00
1923	8,087,250 bbls.	15,189,916.00
1924	7,437,232 bbls.	14,418,982.00

FLUORSPAR PRODUCTION IN KENTUCKY

	Volume	Value
1921	18,670.11 tons	$360,146.42
1922	63,322.20 tons	1,170,194.25
1923	56,803.34 tons	1,181,509.47
1924	46,728.07 tons	965,869.20

NATURAL GAS PRODUCTION IN KENTUCKY.*

	M. Cu. Ft. Volume	Value
1921	4,820,000	$1,597,000.00
1922	5,872,000	1,879,000.00

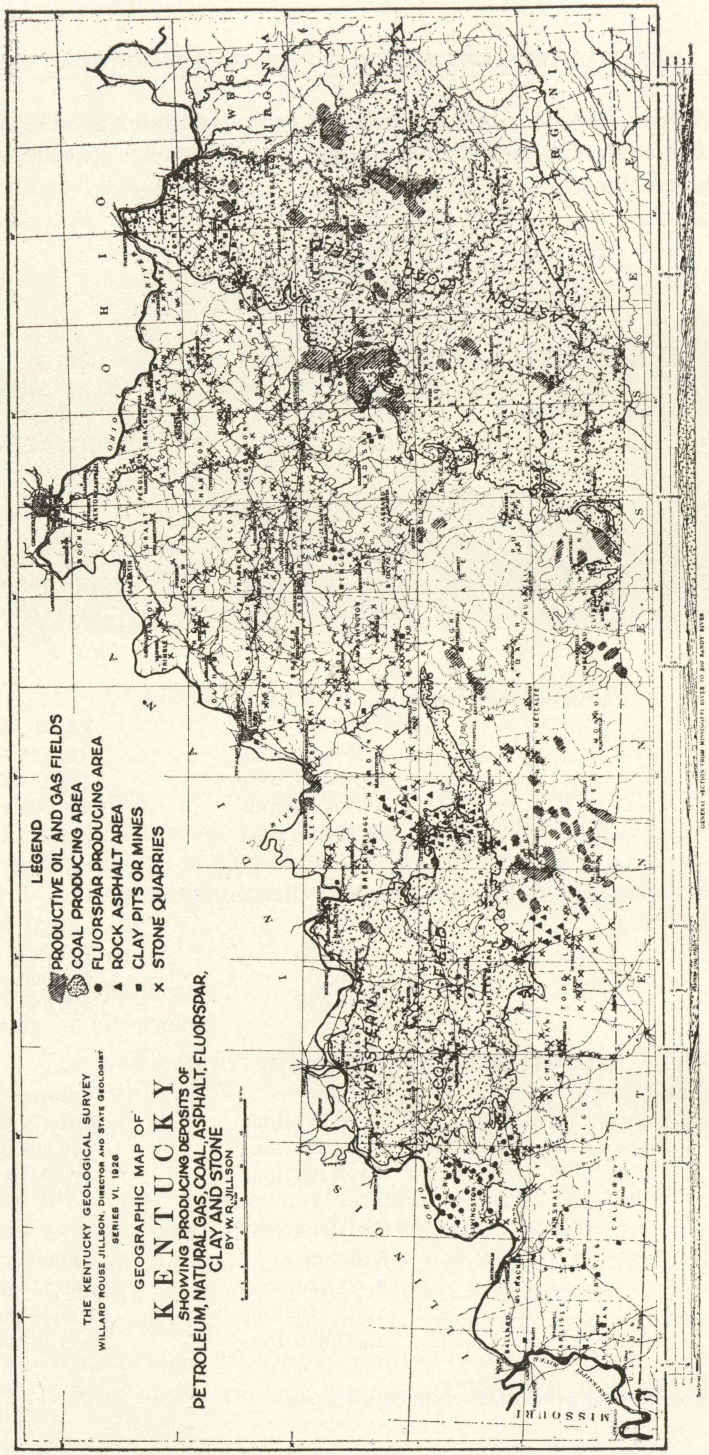
CLAY PRODUCTION IN KENTUCKY.*

	Volume	Value
1921	35,591 tons	$204,400.00
1922	67,591 tons	270,858.00
1923	102,195 tons	428,021.00

STONE PRODUCTION IN KENTUCKY.*

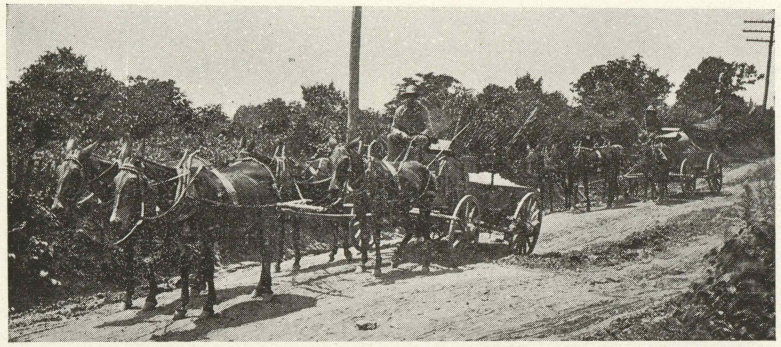
	Volume	Value
1920	1,422,530 tons	$1,756,176.00
1921	1,573,750 tons	1,877,487.00
1922	1,537,690 tons	1,853,851.00

*Records U. S. Geol. Survey.
†Records Kentucky State Tax Commission.



MAP OF KENTUCKY INDEXING MINERAL RESOURCES

Besides the minerals just discussed in some detail, there are in the state of Kentucky in commercial or scientific quantities, about thirty other mineral resources which are partially developed. The most important of these are: Abrasives; Aragonite

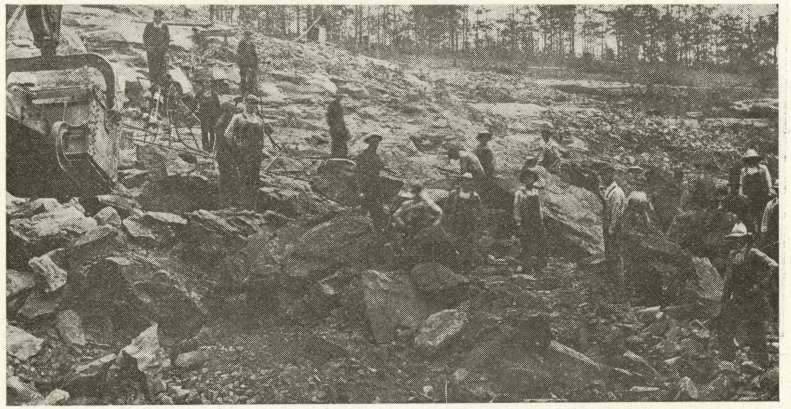


HAULING WASHED WESTERN KENTUCKY FLUORSPAR
One of the factors that has greatly handicapped the fluorspar industry in Crittenden and Livingston Counties, Kentucky, has been primitive concentrating methods. Marion, Crayne and Mexico, are railroad loading points. No other mineral industry could exist today and employ wagon transportation.

(Ky. Onyx); Artificial Gas; Barite; Bituminous Rock; Calcite; Carbon Black; Cements; Clay (pottery, tile, brick, etc.); Coke (beehive and by-product); Copper; Gravel; Gypsum; Iron; Kaolin; Lead; Lime; Limestone; Manganese Ore; Marble; Mica; Mineral Fertilizer; Mineral Waters; Natural Gas; Ochre; Oil; Shale; Onyx; Phosphate Rock; Potash; Pyrites; Salt; Sand; Sandstone; Silver; Stone; Travertine; and Zinc.

Kentucky's mineral development has been greatly retarded in the past by a lack of interest on the part of the citizens of the state in the affairs of the Kentucky Geological Survey, whose primary function it is to discover and report upon the occurrence of the various minerals in the state. One of the fundamental necessities to all detailed geological work is an accurate base map, showing elevations of the surface above sea level. Kentucky is about one-half base mapped at present. There are about 60 of the 120 counties that are either entirely or partly without an accurate base map. These areas are more or less geological wildernesses. They are primarily the backward districts, the so-called "pauper counties."

During the past two years topographical base mapping has been at a standstill in Kentucky, due to lack of any appropriation for this work. Figured, however, at the rate base mapping was going forward up until 1924, at least 50 years will be re-



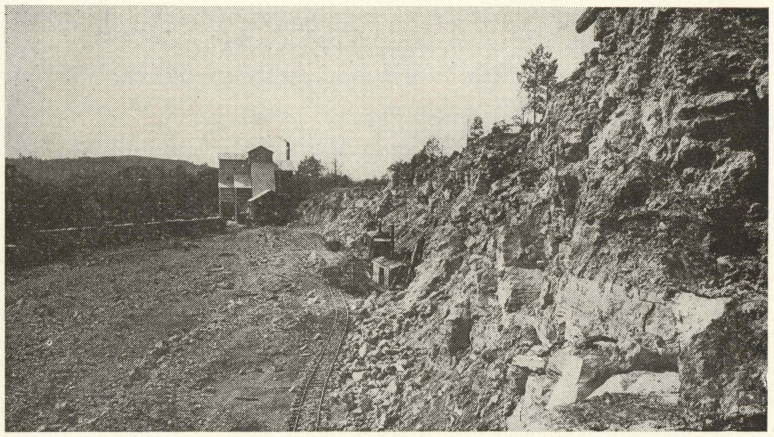
OPEN CUTTING KENTUCKY ROCK ASPHALT

The largest operations in this State, those of the Kentucky Rock Asphalt Company, the Natural Rock Asphalt Company (shown here) in Edmonson County, and the Ohio Valley Rock Asphalt Company in Hardin County employ open quarry methods. Drift mining has been employed in Grayson County with less success.

quired to complete this mapping in Kentucky. Many important mineral resources are known to occur in the unmapped portions of our state. Others which are not known or are undeveloped, undoubtedly also occur in these parts. While Kentuckians have been spending their time in idle and immaterial controversies, the states of West Virginia and Ohio, which have a similar topography and list of mineral and natural resources, have each completed a 100% mapping program. In the year 1925 all states adjoining Kentucky, with possibly the exception of one or two, have more base mapping completed than has Kentucky.

No federal lands exist in this state. Kentucky state lands are of very small extent. The farmers of Kentucky are the principal owners of its undeveloped mineral wealth. While there are now many of them eking out a frugal existence, the knowledge of the minerals on their homesteads would, in many instances, make them independent. Could the farmers of Kentucky be brought to see how closely their individual interest is bound up

with the mapping of their fields, streams and mineral deposits by the Kentucky Geological Survey the day of that great and new prosperity for this state, so frequently proclaimed, would be really at hand.



QUARRY IN MISSISSIPPIAN LIMESTONE

The stone industry is one of the largest in Kentucky. This large operation is located just east of Olive Hill in Carter County, Ky. Its capacity is 35,000 tons per day.

IV.

COMPARATIVE VALUES OF KENTUCKY PETROLEUMS

Within recent years considerable interest has been manifested in the varying character of the petroleums produced in Kentucky. It has become apparent that a considerable difference in crude oils of this State is to be expected not only in widely separated districts, but within the same producing field. Very marked changes are also found in separate oil "sands," and frequently even in the same "sand."

Since it has now become the policy of practically all of the large oil purchasing agencies to grade their oil on a basis of specific gravity—paying the highest price for the light oils, and graduted lower prices for the heavier oils—operators are impelled to give considerable attention to this factor. The probable characteristic of the petroleum of a newly developing field is always of interest. In anticipating the quality of oils to be produced in new territory operators generally make use of oil produced nearby as an index. The procedure is justified on a basis of experience, though it is not entirely reliable.

There are presented herewith seventy-two analyses of petroleum samples taken from various producing fields in this State. Most of these specimens were collected by the writer in the course of field work which has extended over several years in Kentucky. Although generalities are of less value than actual analyses, it is apparent from an examination of the records herein given and much practical field experience that, (1) other things being equal deep oil "sands" wherever located are productive of the lightest oils, (2) the oldest oil "sands," geologically generally produce lighter oil than younger "sands," the difference being marked enough to merit attention even when all of the producing "sands" are of middle or lower Paleozoic age and (3) oil "sands" producing west of Cincinnati Arch are more inclined to a high percentage of sulphur than those of Eastern Kentucky.

It is apparent in summary that oil from the "Corniferous" (Devonian), of Lee County and the "Beaver" (Mississipian) of Wayne County are excellent gasoline producers. The "Berea" (Mississippian) of Lawrence County is a better oil however, where a larger lubricating fraction is desired. Oils from extremely shallow "sands" such as the Corniferous in Lincoln County (Floyd Pool) or Breathitt County (Ragland Pool) are usually found to be of low gravity, dark green to black in color, thick, viscous and frequently asphaltic. Typical Kentucky crude oils, however, taken from depths ranging from 800 to 1800 feet are generally fairly thin green oils, light to dark red or brown by transmitted light. "Amber" reddish yellow oils produced from stray "sands" in the lower Mississippian near the Allen-Barren-Warren county lines are the palest in color of any in this State. Kentucky does not, however, produce in commercial quantity any petroleum as light either in color or gravity as the "Berea" Cabin Creek oil of West Virginia.

Index to County source of petroleums and table showing detailed analyses prepared at various intervals during the last several years by Dr. A. M. Peter, State Chemist, Kentucky Agricultural Experiment Station, University of Kentucky, Lexington, Kentucky, follows:

ANALYSES

Allen County	3
Barren County	2
Carter County	2
Clay County	2
Clinton County	2
Cumberland County	4
Eliott County	3
Hancock County	2
Johnson County	2
Lawrence County	13
Lee County	9
Lincoln County	2
Magoffin County	1
Monroe County	1
Owen County	1
Simpson County	6

Warren County	13
Wayne County	4
Total	72

No. G-3856—Petroleum, labeled "Green oil from the Cumberland Pipe Line at Ivyton, Magoffin County, Ky."

No. G-3893—Petroleum labeled "Dark brown crude oil from the Horace Floyd No. 4, owned by the Versailles Oil Company, four miles due east of McKinney, Lincoln County, Ky. Producing horizon, Onondaga limestone. March 23, 1920."

No. 3894—Petroleum, labeled "Dark brown crude oil from the Horace Floyd No. 7, owned by the Versailles Oil Company, four miles due east of McKinney, Lincoln County. Ky. Producing horizon, Onondago limestone. March 23, 1920."

No. G-3912—Petroleum, labeled "Busseyville Oil & Gas Co., lessee. W. D. Owens, lessor. Near Busseyville. First producing well in Lawrence County, Ky. Berea oil."

No. G-3913—Petroleum, labeled "New Domain Oil and Gas Co. R. J. Peters No. 1, lessor. Near Louisa, Lawrence County. Berea oil."

No. G-3914—Petroleum, labeled "No. 3, Ohio Fuel Oil and Gas Co., lessee. Marion Herd, lessor, No. 1, near Yatesville, Lawrence Co. Berea oil."

No. G-3915—Petroleum labeled "Ophir Oil Co., lessee, No. 5. John Collinsworth, lessor, No. 5. Near Fallsburg, Lawrence Co. Berea oil."

No. G-3957—Petroleum, labeled "Big Blaine Oil & Gas Co., lessee. W. F. Conley, No. 2, lessor. Near Potters, Lawrence Co. Berea oil."

No. G-3958—Petroleum, labeled "Big Blaine Oil & Gas Co., lessee. F. M. Conley, No. 5, lessor. Near Potters, Lawrence Co. Berea oil."

No. G-3959—Petroleum, labeled "Kentucky-West Virginia By-Product Co., lessee. W. P. Dalton, No. 5, lessor. Near Potters, Lawrence Co. H. V. Tygrett. Berea oil."

No. G-3960—Petroleum, labeled "No. 4, Kentucky-West Virginia By-Product Co., lessee. Jesse Bernard, lessor, No. 18. Near Potters, Berea oil. Lawrence Co."

No. G-3461—Petroleum, labeled "Ohio Fuel Oil & Gas Co., lessee. W. B. Pfost, lessor, No. 1. Three miles southeast of Yatesville, Lawrence Co. Berea oil."

No. G-3962—Petroleum, labeled "No. 1, Ohio Fuel Oil and Gas Co., lessee. Minerva Diamond, lessor, No. 2. Three miles southeast of Yatesville, Lawrence County. Berea oil."

No. G-3963—Petroleum, labeled "Ohio Fuel Oil & Gas Co. Thomas H. Burchett, No. 2, lessor. Near Yatesville, Lawrence Co. Berea oil."

No. G-3964—Petroleum, labeled "Ohio Fuel Oil & Gas Co. Raish Blankenship, lessor. Near Busseyville, Lawrence Co. Berea oil."

No. G-3965—Petroleum, labeled "Ohio Fuel Oil & Gas Co., lessee. W. F. Auston No. 2, lessor. Near Potters, Lawrence Co. Berea oil."

No. G-3971—Petroleum, labeled "P. H. Holbrook, lessor, Union Oil and Gas Co., Keaton Fork, Johnson County line. From Red Bush, Ky. Aug. 26, 1920. Weir sand."

No. G-3973—Petroleum, labeled "Green crude oil from W. M. Offill, No. 1, Tygart's Creek, Carter Co., Ky. Onondago limestone."

No. G-4037—Petroleum, labeled "Crude oil from the Britt Gibson No. 1, Weir-Berea. Located near Roscoe P. O. on Middle Fork. Little Sandy River, Elliott County, Ky."

No. G-4038—Petroleum, labeled "Crude oil from the Gail Peters, No. 1, Weir-Berea. Located south of Isonville P. O. on Newcombe Creek, Elliott County, Ky."

No. G-4042—Petroleum, labeled "Kendall Williams farm, Johnson County, Ky."

No. G-4059—Petroleum, labeled "Crude oil from the J. C. Hunter, No. 1 well, Ohio Oil Co., lessee, Sandy Sook Anticline, ½ mile northeast of Sandy Hook, Elliott County Ky. May 12, 1921. Weir sand at 788 feet producing."

No. G-4165—Petroleum, labeled "Oil found on W. L. Ashland's farm, John Brown's farm, Pellville, Hancock County, Ky. Tank sample: Wells are between 500 and 700 feet deep. From wells 1, 2 and 3. Drilled in 1924, by Bert Thompson, contractor, Pellville, Ky."

No. G-4166—Petroleum, labeled "W. G. Payne, Syh Johnson, the Stewart heirs, farm near Reynolds Station, Hancock County, Ky. Tank sample. Wells from 500 to 700 feet deep. Drilled by the Ky. Oil Co., Pelliville, Hancock Co., Ky. Composite sample from wells Nos. 21, 22, 23, 24, 25, 26, 27, 28 and 29."

No. G-3878—Petroleum, labeled "Green crude oil, freshly pumped sample, from Oskamp pool, Boyds creek, **Barren County, Ky.** Pay sand, Onondaga. Collected by W. R. Jillson, Nov. 3, 1919."

No. G-3896—Petroleum, labeled "Crude green oil from the Eva Duncan lease east of Freedom postoffice, **Barren County, Ky.** Oil horizon a stray sand 574 feet below the top of the black shale in the Ordovician limestone. Collected by W. R. Jillson, State Geologist, April 19, 1920."

No. G-3939—Petroleum, labeled "Beech Bottom Oil & Gas Co., lessee, No. 1. J. W. Selvedge, lessor, No. 1. On Spring Creek 7½ miles east of Albany, **Clinton Co., Ky.** First show of oil 1740 ft. Second show 1,763 ft. Third show 1,783 ft."

No. G-3940—Petroleum, labeled "Wood Oil Company, lessee. A. J. Roberts, No. 19, lessor. Elk Springs, 8 miles south of Monticello, **Wayne County, Ky.** Beaver sand 15 ft., 517 to 532 ft. Top black shale 538 ft."

No. G-3942—Petroleum labeled "Old Am. Oil Co., lessee. G. E. Edens, No. 1, lessor. 1½ miles N. E. of Burkesville, **Cumberland County, Ky.**, ½ mile from Cumberland River. Drilled to 800 ft. Oil at 279 ft."

No. G-3943—Petroleum labeled "Old Am. Oil Co., lessee. G. W. Bunchett, No. 1, lessor. Rocky Branch, 1¼ miles N. W. of Burkesville, **Cumberland Co., Ky.** 600 ft. Quit 12-23-19."

No. G-3944—Petroleum, labeled "Greensburg Oil Co., lessee. Ed. Baker, lessor, No. 3, Little Renox Creek, 3 miles from Burkesville, **Cumberland Co., Ky.** Reported 1000 ft. deep."

No. G-3947—Petroleum, labeled "Southern Oil and Refining Company of Denver, Colorado, lessee. Rus Gilbert, No. 1, lessor. On Brush Creek, ½ mile from Cumberland River, 6 miles N. E. of Burkesville, **Cumberland County, Ky.** Trenton rock. Struck 8-9-20."

No. G-3948—Petroleum, labeled "C. E. Dougherty No. 2, Jim Kendrick, lessor No. 4, on Beech Hollow, 3½ miles N. E. of Monticello, **Wayne County, Ky.** Stray sand 415 to 425 ft. Depth 546 ft."

No. G-3949—Petroleum, labeled "Wood Oil Co., lessee, A. J. Roberts, lessor. No. 21 on Elk Springs, 8 miles south of Monticello, **Wayne Co., Ky.** Beaver sand 11 ft. from 506 to 517 ft. 521 top of black shale. 1 bbl. production."

No. G-3950—Petroleum, labeled "C. E. Dougherty, No. 1, Jim Hendrick, No 3, lessor, on Beech Hollow 3½ miles N. E. of Monticello, **Wayne Co., Ky.** Beaver sand 500 to 512 feet. Depth 514 ft. Production 12 bbl. Last 2 ft. sediment."

No. G-4072—Petroleum, labeled "Green crude oil. Lessor, James A. Flowers. Lessee, Beach Bottom Oil and Gas Co. Locality, Beech Bottom, **Clinton Co., Ky.** Collector, Adj. Gen. Jackson Morris. Oil sand, Trenton 1,769 ft. Well, Beech Bottom No. 1. Date Oct. 15, 1921."

No. G-3977—Petroleum, labeled "Henry H. Lawrence, average production from all wells on lease. Big Dipper Oil Co., lessee. In **Warren County** near Barren Co. line. Corniferous sand."

No. G-3981—Petroleum, labeled "O. M. Stringer, No. 5, lessor, Irvine J. Brown, lessee. On Sulphur, **Allen County.** Mixed Beaver and Corniferous."

No. 3982—Petroleum, labeled "Stringer Bros., No. 6, lessor. Irvine J. Brown, lessee. Sulphur Creek, **Allen County.** Corniferous sand."

No. G-3983—Petroleum, labeled "Angie McReynolds, lessee, **Allen Co., Ky.** Received Oct. 1, 1920."

No. G-3984—Petroleum, labeled "Tom Boyd, No. 2, lessor. Moore and McGlothin, lessee. On Drake's Creek, 4 miles south of Franklin, **Simpson County.** Corniferous sand."

No. G-3985—Petroleum, labeled "John William Holcomb, No. 1, lessor. Green and Brown, lessee. One mile south of Hillsdale, **Simpson County.** Corniferous sand."

No. G-3986—Petroleum, labeled "Moore and McGlothin, lessee. Tom Boyd, No. 2, lessor. On Drakes Creek 4 miles south of Franklin, **Simpson County.** Corniferous sand."

No. G-3987—Petroleum, labeled "Joe T. Harris, lessor. Blair and others, lessee. Located at Temperance, **Simpson County.** Corniferous sand."

No. G-3988—Petroleum, labeled "W. B. Uhls No. 1, lessor. Doyle and others lessee. One mile from Hillsdale, **Simpson County.** Corniferous sand."

No. G-3989—Petroleum, labeled "Claude Thomas, lessor, shallow sand. On Smallhouse pike, 6 miles south of Bowling Green, **Warren County.**"

No. G-3990—Petroleum, labeled "Luther Conk, No. 1. Tri-State Oil & Gas Co., on Glen Lily pike, within city limits of Bowling Green, **Warren County.** Beaver sand."

No. G-3991—Petroleum, labeled "Ella Torrent No. 3, lessor. Stine, Johnson and Herstetter, lessee. Located 3½ miles west of Bowling Green on the Barren River pike, **Warren County.** Beaver oil."

No. G-3992—Petroleum, labeled "E. J. Miller, No. 1, lessor. E. J. Miller Oil and Gas Company, lessee. 1½ miles northwest of Bowling Green on Glen Lily pike, **Warren County.** Corniferous sand."

No. G-3993—Petroleum, labeled "Virgil Tabor, average of all wells. Chase and Irish, lessee. On Barren-Warren line. **Warren County.** Corniferous sand."

No. G-3994—Petroleum, labeled "West Whitney No. 1, lessor, Pittsburg Oil & Gas Co., lessee. At Memphis Junction, **Warren County.** Beaver oil. In tank 2 days."

No. G-3995—Petroleum, labeled "On Porter pike. Fred Gott No. 3, lessor. Independent Producing Oil Company. Corniferous sand. 4 miles east of Bowling Green, on Barren River, **Warren County.**"

No. G-3996—Petroluem, labeled "Briggs lease, No. 1, Bertram Development Company, on Glen Lily pike, 1 mile west of Bowling Green, **Warren County.** Corniferous sand."

No. G-3997—Petroleum, labeled "Bailey lease No. 1. Bailey Oil Syndicate, lessee. Shallow sand Beaver. 5½ miles south of Bowling Green, **Warren County.**"

No. G-3998—Petroleum, labeled "F. Banch, No. 1, lessor. Tampa Ky. Oil Co., lessee. 6 miles north of Franklin on Simpson-Warren County line, **Simpson County.** Corniferous sand."

No. G-3999—Petroleum, labeled "Jake Moulder, average of all wells taken from tank. Swiss Oil Corporation, lessee. 14 miles east of Bowling Green, near Allen County line, **Warren County.** Corniferous sand."

No. G-4000—Petroleum, labeled "Hugh Potter No. 4. White and Moore. Beaver sand. 5½ miles south of Bowling Green, **Warren County.**"

No. G-4001—Petroleum, labeled "Jake Moulder, No. 12, lessor. Swiss Oil Corporation lessee. 14 miles east of Bowling Green, near Warren-Allen line, **Warren County.** Corniferous sand."

No. G-4026—Petroleum, labeled "Seepage oil, **Carter County.** J. B. Patton's farm. Collected by W. R. Jillson."

No. G-4027—Petroleum, labeled "B. M. Smith, No. 4, lessor. Cumberland Land Petroleum Oil & Gas Co., lessee. On Big Sinking Creek, **Lee County.** Corniferous sand."

No. G-4028—Petroleum, labeled "Eureka Tract, No. 4, lessor. Southwestern Petroleum Co., lessee. At headwaters of Cave Fork, **Lee County.** Corniferous sand."

No. G-4029—Petroleum, labeled "Prewitt, Miller & Wells, lessor, No.? Petroleum Exploration Oil & Gas Co., lessee. Townsend Fork of Big Sinking Creek, **Lee County.** Corniferous sand."

No. G-4030—Petroleum, labeled "Eureka Tract, No. 25, Southwestern Petroleum Co., lessee. 1 mile south of Zachariah, **Lee County.** Corniferous sand."

No. G-4031—Petroleum, labeled "Rex Pyramid Oil & Gas Company, lessee, Martha Reynolds, No. 3, lessor. At mouth of Cave Fork of Big Sinking Creek, **Lee County.** Corniferous sand."

No. G-4032—Petroleum, labeled "Rex Pyramid Oil & Gas Co., lessee. H. Williams, No. 10, lessor. Mouth of Cave Fork of Big Sinking Creek, **Lee County.** Corniferous sand."

No. G-4033—Petroleum, labeled "Richard Nichols, No. 4, lessor. Torrent Oil & Gas Company, lessee, at Zachariah, **Lee County.** Corniferous sand."

No. G-4034—Petroleum, labeled "Maloney & Collins, lessee. W. T. Booth, No. 5, lessor. On Brushy Fork of Big Sinking Creek, **Lee County.** Corniferous sand."

No. G-4035—Petroleum, labeled "Arch Wilson, lessor, No. 3. Southwestern Petroleum Company, lessee. 1½ miles above mouth of Cave Fork of Big Sinking Creek, **Lee County.** Corniferous sand."

No. G-4108—Petroleum, labeled "Budd Kerr, No. 3, Kettle Creek, **Monroe County, Ky.** Collected by W. R. Jillson, Aug. 26, 1923."

No. G-4109—Petroleum, labeled "From well No. 1, E. Marcom, Willow Grove, **Clay County, Tennessee.** Collected by W. R. Jillson, Aug. 26, 1923."

No. G-4110—Petroleum, labeled "Arch Short, No. 1, lessor, Powell Oil Co., lessee. Short Hollow of Kettle Creek, **Clay County, Tennessee.** Collected by W. R. Jillson, Aug. 26, 1923."

No. G-4210—Petroleum, labeled "Near Wheatley, **Owen County, Ky.**, C. W. Reister farm. Depth 398-402 ft. Ordovician. Collected by W. R. Jillson, Dept., 1923."

COUNTY NAME	Magoffin	Lincoln	Lincoln	Lawrence	Lawrence	Lawrence
Laboratory No.	G-3856	G-3893	G-3894	G-3912	G-3913	G-3914
Specific gravity	.835	.876	.870	.830	.831	.820
Equivalent Baume	37.7°	29.8°	30.9°	38.7°	38.5°	40.7°
Distilled below 150° C. (302° F.)*	20.0	17.0	19.0	21.2	21.2	21.8
Distilled 150°-300° C. (302°-572° F.)**	31.0	24.3	24.0	33.0	33.0	32.5
Residue***	49.0	58.0	56.0	45.0	45.0	43.0
Loss		.7	1.0	.8	.8	2.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight		.43	.46	.24	.22	.25
Began to distill at:						
Centigrade	65°	55°	53°	60°	60°	46°
Farenheit	149°	131°	129°	140°	140°	115°

COUNTY NAME	Lawrence	Lawrence	Lawrence	Lawrence	Lawrence	Lawrence
Laboratory No.	G-3915	G-3957	G-3958	G-3959	G-3960	G-3961
Specific gravity	.832	.8288	.8248	.8268	.8318	.8278
Equivalent Baume	38.3°	38.25°	39.7°	39.3°	38.3°	39.1°
Distilled below 150° C. (302° F.)*	20.8	22.0	23.0	21.7	20.8	23.0
Distilled 150°-300° C. (302°-572° F.)**	33.0	32.0	30.6	32.0	34.8	31.0
Residue***	44.0	46.0	44.5	44.5	44.5	45.0
Loss	2.2		1.9	1.8		1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight	.25					
Began to distill at:						
Centigrade	56°	50°	45°	40°	50°	51°
Farenheit	130°	122°	113°	148°	122°	124°

* Gasoline fraction, per cent by volume.
** Burning oil fraction, per cent by volume.
*** Per cent by volume.

COUNTY NAME	Lawrence	Lawrence	Lawrence	Lawrence	Johnson	Carter
Laboratory No.	G-3962	G-3963	G-3964	G-3965	G-3971	G-3973
Specific gravity	.8288	.8345	.8325	.8232	.8355	.863
Equivalent Baume	38.9°	37.8°	38.2°	40.1°	37.5°	32.2°
Distilled below 150° C. (302° F.)*	21.2	21.5	20.2	23.2	21.2	4.0
Distilled 150°-300° C. (302°-572° F.)**	33.3	31.5	33.5	31.2	29.0	38.6
Residue***	45.5	47.0	45.0	44.0	49.0	57.0
Loss			1.3	1.6	.8	.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight						
Began to distill at:						
Centigrade	58°	58°	58°	43°	52°	80°
Farenheit	136°	136°	136°	109°	126°	176°

COUNTY NAME	Elliott	Elliott	Johnson	Elliott	Hancock	Hancock
Laboratory No.	G-4037	G-4038	G-4042	G-4059	G-4185	G-4166
Specific gravity	.855	.8555	.8475	.8595	.8748	.8715
Equivalent Baume	33.7°	33.6°	35.2°	32.9°	30.0°	30.6°
Distilled below 150° C. (302° F.)*	15.0	15.4	15.0	11.0	8.1	9.1
Distilled 150°-300° C. (302°-572° F.)**	34.0	31.2	31.9	32.5	33.1	36.3
Residue***	51.0	53.4	52.5	56.0	58.8	54.6
Loss			.6	.5		
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight	.20	.17	.27	.27		
Began to distill at:						
Centigrade	46°	45°	53°	75°	100°	100°
Farenheit	115°	113°	127°	167°	212°	212°

** Burning oil fraction, per cent by volume.
*** Per cent by volume.
** Burning oil fraction, per cent by volume.

COUNTY NAME	Barren	Barren	Clinton	Wayne	Cumberland	Cumberland
Laboratory No.	G-3878	G-3896	G-3939	G-3940	G-3942	G-3943
Specific gravity	0.839	0.862	0.822	0.833	0.8545	0.8355
Equivalent Baume	36.9°	32.4°	43.3°	38.0°	33.8°	37.6°
Distilled below 150° C. (302° F.)*	18.1	2.5	27.5	25.8	8.5	17.6
Distilled 150°-300° C. (302°-572° F.)**	46.3	54.4	33.5	35.0	43.5	39.5
Residue***	35.0	43.1	37.0	38.5	47.5	42.5
Loss	.6		2.0	.7	.5	.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight		1.01		0.42	0.30	
Began to distill at:						
Centigrade		80°	45°	50°	67°	65°
Farenheit		176°	113°	122°	152.6°	149°

COUNTY NAME	Cumberland	Cumberland	Wayne	Wayne	Wayne	Clinton
Laboratory No.	G-3944	G-3947	G-3948	G-3949	G-3950	G-4072
Specific gravity	0.868	0.830	0.8255	0.8362	0.811	0.8235
Equivalent Baume	31.3°	38.7°	39.6°	37.4°	42.6°	44.4°
Distilled below 150° C. (302° F.)*	2.5	23.5	28.5	25.0	28.8	26.0
Distilled 150°-300° C. (302°-572° F.)**	50.0	41.5	36.5	32.5	32.5	34.0
Residue***	47.5	35.0	35.0	42.0	36.5	38.0
Loss				.5	2.2	2.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight	.38					
Began to distill at:						
Centigrade	90°	60°	54°	57°	38°	35°
Farenheit	194°	140°	129°	135°		95°

* Gasoline fraction, per cent by volume.
** Burning oil fraction, per cent by volume.
*** Per cent by volume.

COUNTY NAME	Warren	Allen	Allen	Allen	Simpson	Simpson
Laboratory No.	G-3977	G-3981	G-3982	G-3983	G-3984	G-3985
Specific gravity	.830	.813	.815	.853	.822	.845
Equivalent Baume	38.7°	42.4°	41.8°	34.1°	40.3°	35.7°
Distilled below 150° C. (302° F.)*	25.2	27.6	26.5	17.0	28.5	13.0
Distilled 150°-300° C. (302°-572° F.)**	36.6	36.5	34.5	34.5	35.0	47.0
Residue***	37.5	35.9	38.0	48.0	36.0	39.5
Loss	.7		1.0	.5	.5	.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight	0.7	0.6	0.7	0.4	0.6	0.6
Began to distill at:						
Centigrade	41°	35°	45°	75°	46°	104°
Farenheit	106°	95°	113°	167°	115°	219°

COUNTY NAME	Simpson	Simpson	Simpson	Warren	Warren	Warren
Laboratory No.	G-3986	G-3987	G-3988	G-3989	G-3990	G-3991
Specific gravity	.820	.825	.851	.875	.874	.835
Equivalent Baume	40.8°	39.7°	34.5°	30.1°	30.3°	37.7°
Distilled below 150° C. (302° F.)*	26.5	26.0	10.0			20.5
Distilled 150°-300° C. (302°-572° F.)**	35.5	38.0	42.5	43.0	42.0	33.5
Residue***	37.0	36.0	47.5	57.0	58.0	45.0
Loss	1.0					1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight	0.4	0.5	0.5	0.8	0.6	0.3
Began to distill at:				Above		
Centigrade	47°	58°	90°	150°	164°	42°
Farenheit	117°	136°	194°	302°	327°	108°

* Gasoline fraction, per cent by volume.
** Burning oil fraction, per cent by volume.
*** Per cent by volume.

COUNTY NAME	Warren	Warren	Warren	Warren	Warren	Warren
Laboratory No.	G-3992	G-3993	G-3994	G-3995	G-3996	G-3997
Specific gravity	.831	.834	.851	.872	.834	.838
Equivalent Baume	38.5°	38.0°	34.5°	30.5°	37.9°	37.1°
Distilled below 150° C. (302° F.)*	20.0	23.0	16.0	5.0	21.5	21.0
Distilled 150°-300° C. (302°-572° F.)**	32.5	36.0	37.0	36.0	31.5	35.5
Residue***	46.0	40.5	47.0	59.0	46.5	43.5
Loss					0.5	
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight	0.4	0.5	0.4	0.7	0.4	0.4
Began to distill at:						
Centigrade	47°	48°	64°	103°	46°	43°
Farenheit	117°	118°	147°	217°	115°	109°

COUNTY NAME	Simpson	Warren	Warren	Warren	Carter†	Lee
Laboratory No.	G-3998	G-3999	G-4000	G-4001	G-4026	G-4027
Specific gravity	.860	.851	.828	.839	.949	.816
Equivalent Baume	32.9°	34.5°	39.1°	37.0°	17.5°	41.7°
Distilled below 150° C. (302° F.)*	9.5	11.0	21.0	21.5		23.0
Distilled 150°-300° C. (302°-572° F.)**	41.5	42.0	33.5	35.0	15.0	31.0
Residue***	49.0	47.0	45.0	43.0	85.0	45.5
Loss			.5	.5		.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight	0.4	0.7	0.7	0.8	0.2	
Began to distill at:						
Centigrade	90°	80°	43°	48°	235°	39°
Farenheit	194°	176°	109°	118°	455°	102°

* Gasoline fraction, per cent by volume.
** Burning oil fraction, per cent by volume.
*** Per cent by volume.
† This specimen came from an oil seep and was asphaltic.

COUNTY NAME	Lee	Lee	Lee	Lee	Lee	Lee
Laboratory No.	G-4028	G-4029	G-4030	G-4031	G-4032	G-4033
Specific gravity	.812	.820	.815	.817	.815	.826
Equivalent Baume	42.4°	40.7°	41.8°	41.4°	41.8°	39.5°
Distilled below 150° C. (302° F.)*	23.0	24.0	24.0	22.5	23.5	22.5
Distilled 150°-300° C. (302°-572° F.)**	30.5	30.5	30.0	30.5	30.0	30.5
Residue***	46.0	45.0	45.0	46.0	45.5	46.0
Loss	.5	.5	1.0	1.0	1.0	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight						
Began to distill at:						
Centigrade	38°	39°	40°	36°	40°	45°
Farenheit	100°	102°	104°	96.8°	104°	113°

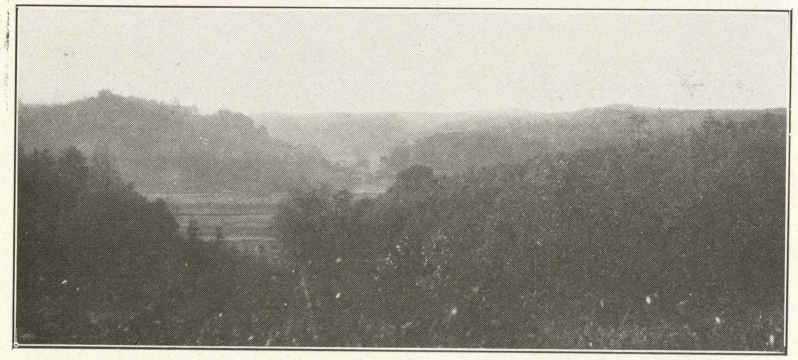
COUNTY NAME	Lee	Lee	Monroe	Clay Co., Tenn.	Clay Co., Tenn.	Owen
Laboratory No.	G-4034	G-4035	G-4108	G-4109	G-4110	G-4210
Specific gravity	.816	.815	.826	.827	.835	.846
Equivalent Baume	41.6°	41.8°	39.5°	39.4°	37.8°	35.5°
Distilled below 150° C. (302° F.)*	23.0	22.5	23.0	20.5	15.5	19.0
Distilled 150°-300° C. (302°-572° F.)**	30.5	30.5	49.0	38.5	45.5	32.5
Residue***	45.5	46.0	38.0	40.0	39.0	48.0
Loss	1.0	1.0		1.0		0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur, per cent by weight			0.3	0.3	0.2	0.5
Began to distill at:						
Centigrade	32°	31°	59°	46°	95°	53°
Farenheit	89.6°	87.8°	138°	115°	203°	127°

* Gasoline fraction, per cent by volume.
** Burning oil fraction, per cent by volume.
*** Per cent by volume.

V.

EXPLORATIONS FOR OIL AND GAS IN BOYD COUNTY, KENTUCKY.*

Although it is the smallest in area of any major subdivision of Eastern Kentucky, Boyd County (165.32 square miles), situated at the confluence of the Big Sandy and Ohio Rivers,



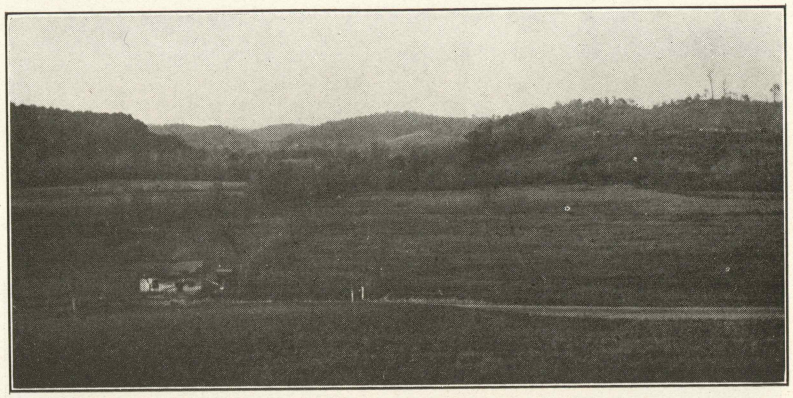
Dissected Plateau Near Princess, Boyd County.

possesses a very unique and strategic geographical location. This position important in any consideration of transportation and industry is in itself adequate compensation for a reduced boundary. The county was established in 1860 from parts of Greenup, Carter and Lawrence counties. These counties bound Boyd in their respective order on the North, West and South. The States of West Virginia and Ohio join it on the East.

The principal city of Boyd County is Ashland (founded in 1854) a very rapidly growing iron, steel, fire brick, and general manufacturing center. Its population now increasing steadily was 14,729 in 1920 and is now estimated to be 23,250 or more. Catlettsburg, a much smaller though older town, is the county seat. The field work supplying the data upon

*Presented before the 12th annual meeting of the Ky. Acad. of Science at Lexington, Ky., May 15, 1925.

which this paper is founded has been executed by the writer in person at various intervals during the last several years.



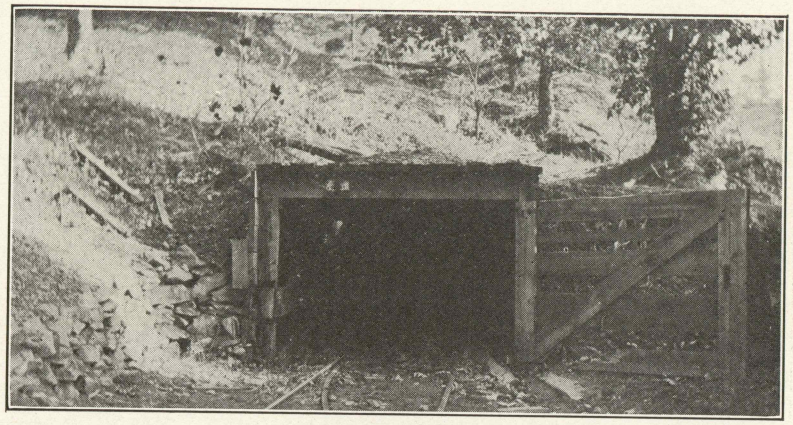
Straight Creek Valley Near Coalton.

Topography and Drainage

Topographically, Boyd County is not as rough an area as its internal position in the Eastern Kentucky coal field might seemingly indicate. It is in reality a low, hilly country, mature in its dissection. Old plateau summit levels rise from 800 feet in the Northern part of the county to about 1,000 feet at the Lawrence County line in the south. Trenching in to this old abandoned channel, notably in the vicinity of Ashland at surface, preglacial and glacial streams of large size have left abandoned channels, notably in the vicinity of Ashland at elevations of about 690 feet. The present flood plain level of the Ohio River is about 550 feet above sea level. From this elevation the tributary drainage grades upwards.

The highest point in the county is located on the divide three miles west of Savage, and is slightly in excess of 1150 feet. Boyd County, therefore, exhibits a maximum physical relief of 600 feet. The major drainage consists of the Ohio and Big Sandy Rivers which bound it on the Northeast and East. The minor drainage consists of the lower waters of the East Fork of Little Sandy River, and a number of small streams such as Durbin Creek, Whites Creek, Chadwick Creek, tributaries of the Big Sandy River; and Catletts Creek, Keys

Creek and Hoods Creek, tributaries of the Ohio River. The East Fork of Little Sandy flowing to the North into Greenup County and thence to the Ohio is the principal interior stream of the County.



A RUSH CREEK COAL MINE
The Coalton or No. 7 coal which has been operated here has extensive development in western Boyd County.

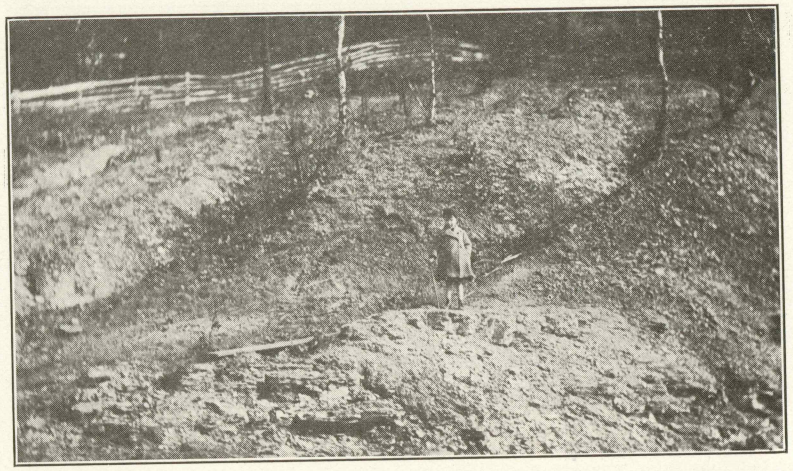
Stratigraphy

Rocks of Coal Measure age only are exposed in Boyd County. These Pennsylvania sediments consisting of an alternating series of sandstones, sandstone conglomerates, sandy shales, shales, fire clays, coals, and four or five thin and semi-persistent limestones, attain an aggregate thickness of about 1,000 feet. Of this stratigraphic section between 500 and 600 feet are exposed. These Coal Measure sediments have been divided[1] in ascending order into the Pottsville, Allegheny, and Conemaugh formations.

The greater part of the Pottsville occurs below drainage. It comes to the surface only in the valley bottoms of the northern part of the county. The Allegheny formation resting upon the Pottsville extends in outcrop as far south as Garner, Wavity, and Savage Station, while the Conemaugh blankets completely the southern third of the County. Ten separate coals have been recognized in this group of Pennsyl-

[1] The Kenova Folio, W. C. Phalen, U. S. Geol. Survey, Folio No. 184, Washintgon, 1913.

vanian rocks, and of these five the lower Freeport (No. 8), Middle Kittaning (No. 7), Lower Kittaning (No. 6), Upper Mercer (No. 4) and Lower Mercer (No. 3) attain some commercial importance.



Plastic Fire Clay Near Rush Station.

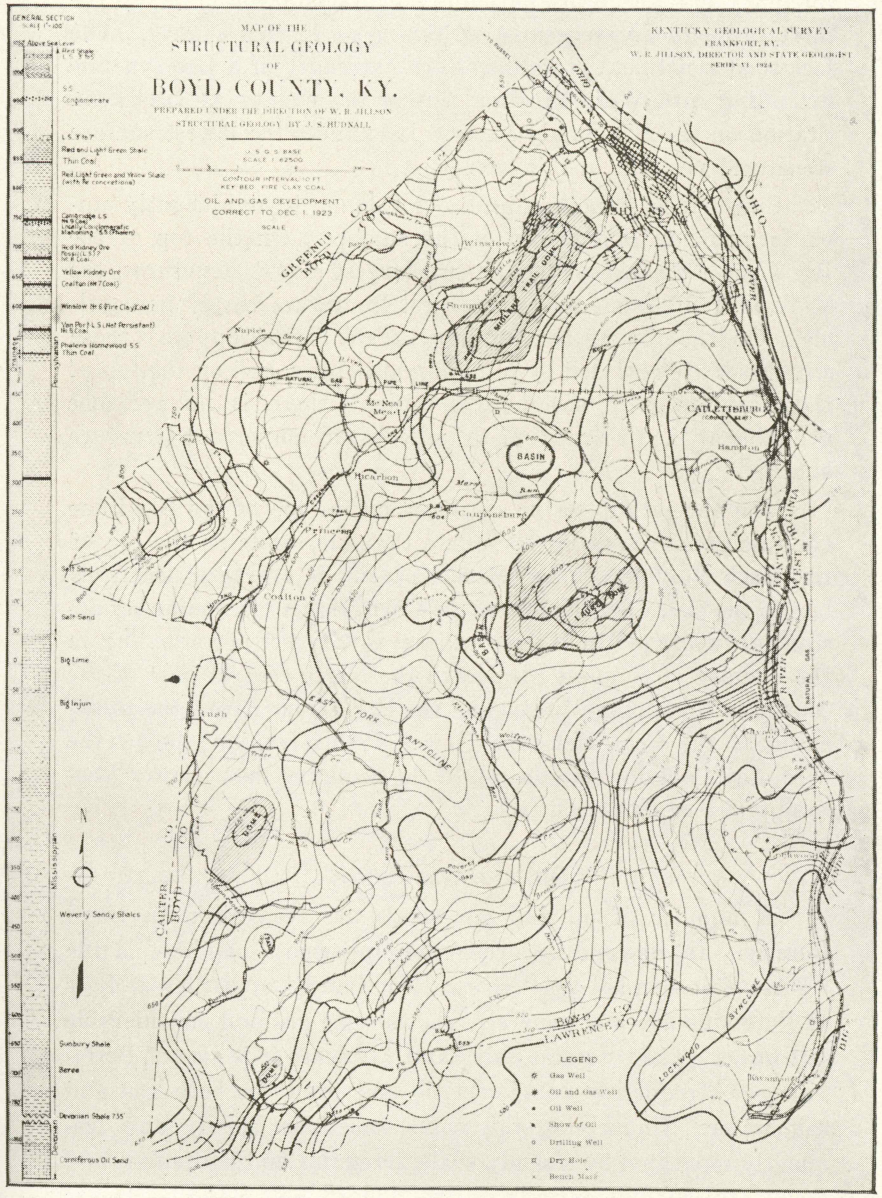
Beneath the surface rocks are found sedimentary representatives of the Mississippian, Devonian, Silurian and Ordovician systems within the first 3,000 feet of depth.

Structure

The structure of the bedded rocks of Boyd County is simple. The region is not faulted, and all sediments are tilted at very slight angles with the horizontal. No pronounced folds are known within this area. The normal surface dip (Fire Clay coal) is to the southeast at the rate of 35 feet to the mile. The subsurface dip on the top of the Sunbury shale is to the southeastward at the rate of 67 feet to the mile.

The surface structure has been completely mapped[2] on fire clay coal. It exhibits three small domes: (1) The Midland Trail Dome (elongated) immediately southwest of Ashland, (2) the Laurel Dome (circular) about four miles southwest of Catlettsburg, and (3) a small closed structure at the head of Four

[2] Map of the Structural Geol. of Boyd County, Ky., by J. S. Hudnall. Ky. Geol. Survey, Series VI, 1924.



Surface Structural Geology of Boyd County, Ky.

Mile Creek in the southwestern part of the county near the Carter line. The East Fork anticline and Ashland anticline are the most pronounced structures of this type in this county. The lockwood syncline, the southwestern extremity of a Geo-syncline extending into West Virginia, enters the county at Lockwood Station on the Big Sandy River. It exhibits the lowest surface structural position in this county.

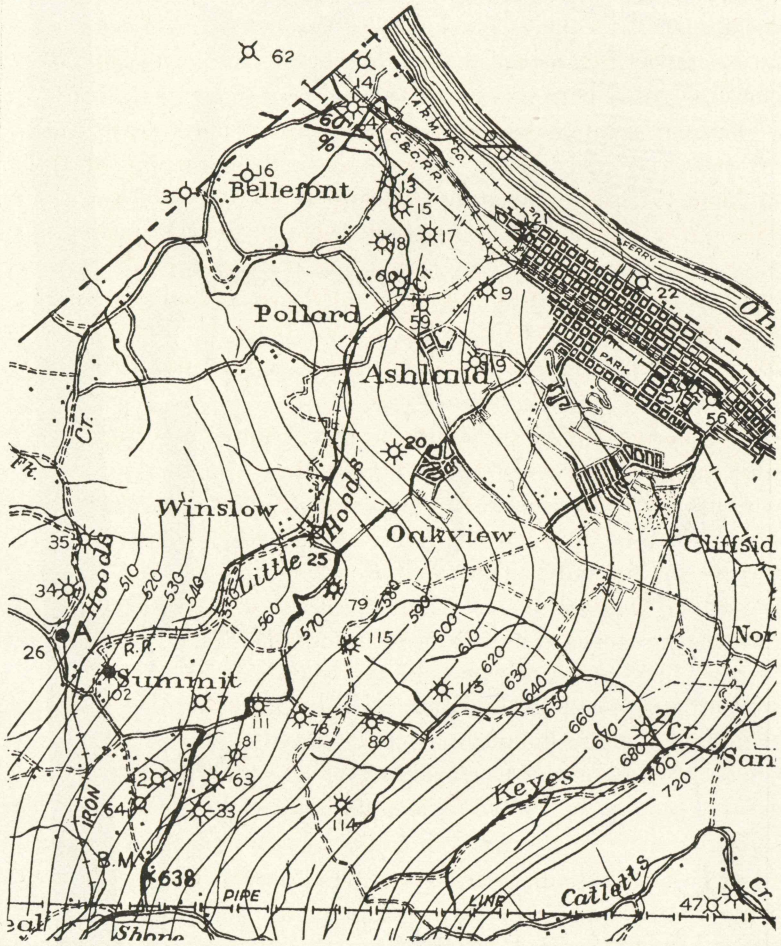
Subsurface structure in Boyd County is significantly unconformable to that shown at the surface. On the top of the Big Lime (Mississippian) the two largest closed structures, the Midland Trail Dome and the Laurel Dome, are barely perceptible. On the top of the Sunbury shale (Mississippian) those structures are replaced by plunging anticlines, and on the top of the Corniferous Limestone (Devonian) there is no evidence available at the present time to indicate any important structure at all.

The normal dip to the southeast on the top of the Big Lime (Mississippian) is about 60 feet to the mile, while on the top of the black Sunbury shale (Mississippian) it averages nearly 67 feet to the mile. On the top of the Corniferous (Devonian) limestone the average dip to the southeast is 86.5 feet per mile. From the vicinity of Summit Station in the North-central part of the county to Kavanaugh Station on the Big Sandy River, the thickening of the Coal Measures (lower Pennsylvanian) below the Fire Clay Coal down to the top of the Sunbury shale (lower Mississippian) is about 562 feet.

Oil and Gas Sands

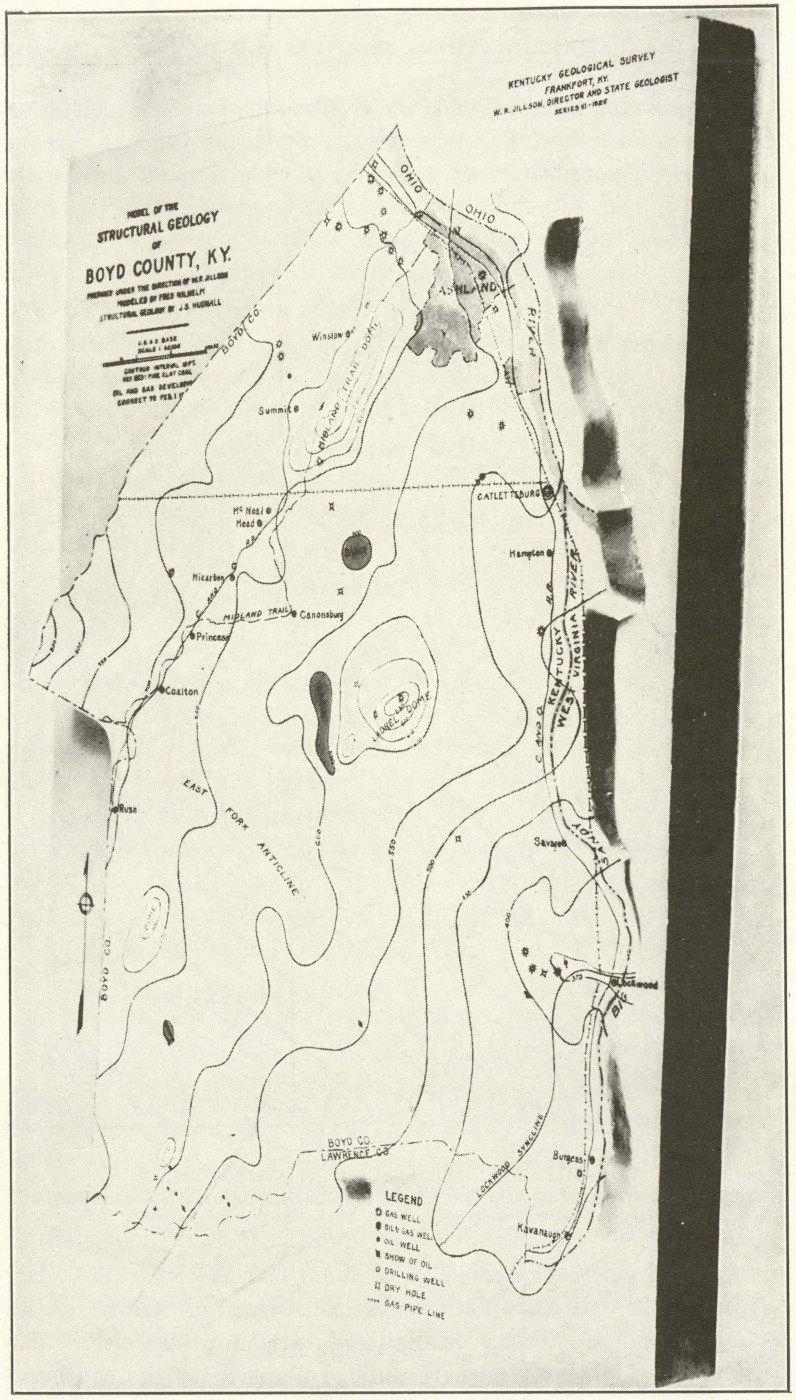
A number of oil and gas sands are recognized in Boyd County. In descending order the uppermost of these is the "First Salt Sand," the "Grass Root Sand" of drillers. It is of Pottsville age and generally shows some gas and considerable salt water. The "Second Salt Sand" beneath it is also of Pottsville age, frequently conglomeritic and produces both gas and salt water. Underlying this sand sometimes closely and frequently separated by a sandy shale, irregular and lenticular, and frequently cut out entirely, is the "Third Salt Sand." It has not yet been shown to be of commercial importance.

Occurring almost immediately below the Big Lime (Chester-Mississippian) the "Big Injun" gas sand, showing natural gas and large amounts of salt water, is sharply defined and easily



SUB-SURFACE STRUCTURE NEAR ASHLAND
The contours are on the top of the Sunbury Shale (Mississippian) and are given in feet below sea level. Structure by W. R. Jillson, 1925.

recognized wherever drilled. For about 600 feet below the "Big Injun" the Mississippian rocks consisting of sandy shales (Logan and Cuyahoga formations) are unproductive. The Cuyahoga contains elsewhere and principally to the southeast



Model Showing Surface Structure, Boyd County, Ky.

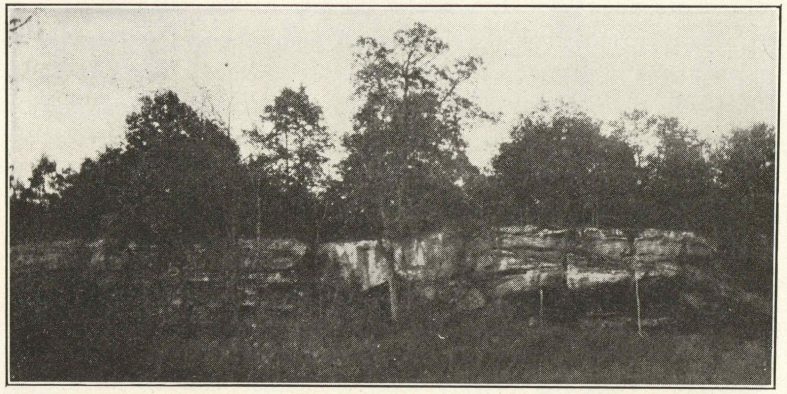
in the Johnson-Magoffin-Lawrence-Elliott field along the Paint Creek Uplift the well known and productive Wier sand. It has not any commercial importance in Boyd County up to the present time, and so is not recognized by drillers. The "Berea sand" occurring about 700 feet below the top of the Mississippian is generally productive of oil in small amounts and sometimes of natural gas in commercial quantities. Separated from the Berea by a thin shale the underlying Bedford sandstone is generally a gas producer. It is commonly but erroneously regarded by drillers as the lower part of the Berea, and is thus frequently discussed and recorded in well logs.

The underlying Devonian shales (Ohio and Chattanooga) exhibit at various points three separate and distinct gas producing horizons. These are not true sands, but are very slightly sandy of lightly calcareous phases of the black shale, characterized by a relatively high porosity. These "sands" have been denoted I. the "Shale Sand," II. the "Gordon Sand" and III. the "Ashland Gas Sand." Accurate correlations at this time are quite impossible, due to a lack of detailed well records Further drilling may clarify these relationships and indicate a possible basis of correlation with other portions of the Appalachian field. The socalled Corniferous limestone (Hamilton and Onondaga-Middle Devonian) immediately subjacent is a well known producer of oil and gas in Kentucky. In Boyd County it has produced oil in small quantities, but good quality at a number of points, notably in the vicinity of Summit and Ashland. Its gas production is generally small in quantity as compared to the Appalachian gas sands, but when properly cared for is of relatively long life.

Beneath this horizon, which is found at depths ranging from 2,000 to 2,800 feet, no other commercially important oil and gas producing horizons are now known in Boyd County. The Clinton Sand, so productive in parts of Eastern Ohio and elsewhere, has been found to be unproductive at all points where penetrated in Boyd County and adjacent parts of Carter County and Ohio*. It should be pointed out, however, that only a rela-

*The Clinton "sand" was drilled dry at 4,500 to 4,540 feet in a well drilled 15 miles east of Huntington, W. Va., and 2.7 miles northwest of Milton, by the Nixon Oil and Gas Co., in 1924. This well was abandoned at 4,850 feet.

tively few wells have penetrated this deep Silurian Sand. A summary of productive sands of this region indicates that the "Salt Sand," "Big Injun" sand, the "Berea" sand, and some one or two of the three "sands" in the Devonian shale are the



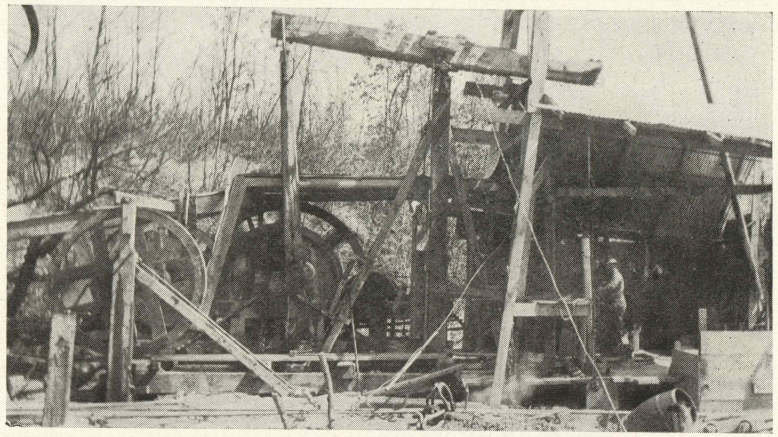
Massive Mahoning Sandstone, Shope Creek.

most important natural gas horizons. The "Berea" sandstone and the "Corniferous" limestone are the only ones which may be looked to for petroleum in commercial quantities. Wherever drilled in each of these "sands" produces some oil and in the vicinity of Summit, Ashland and on Laurel Creek a number of wells have produced as much as five or more barrels from these sands. While the outlier of relatively high regional metamorphism (60%) surrounding Ashland operates theoretically to reduce the available volume of petroleum and increase the volume of natural gas, the fact remains that oil of fairly high gravity and splendid lubricating base has been discovered at a number of points. Higher prices for crude oil than those recently prevailing will undoubtedly bring about renewed interest in exploratory drilling and very possibly may result in the discovery of one or more important fields.

Development and Production

Although definite records are not available, it appears that the first wells drilled for oil and gas in Boyd County were spudded in and completed during the decade, 1880-1890. Several wells are reported to have been drilled during the

period, 1890-95, when there seems to have been considerable interest in oil and gas exploration, principally by the old and now defunct Ashland Iron and Mining Company, of Ashland, Kentucky. A number of these old and abandoned wells,

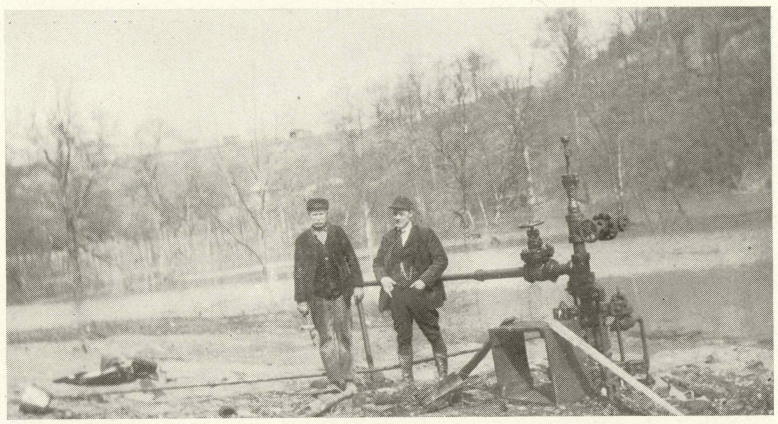


A DANIELS FORK DRILLING
This is the Lewis Skaggs No. 1 drilling in the Devonian shale, April 2, 1925. Wm. Foreman, contractor.

notably the Longabaugh well at Winslow Station, the well southeast of Summit Station on the American Rolling Mill Co.'s property, and the Towler well one mile northwest of Princess were shallow, penetrating according to records and report only as far as the "Big Injun" or "Berea" Sands. Records of the Old Summit and Winslow wells have fortunately been preserved, but the Towler log if ever recorded has long since been lost.

About 1895 to 1900 deeper drilling began to be undertaken, and it was at this time that natural gas in the Devonian black shale was first found. An example of the successful deep wells of this time is seen in the W. A. Patton No. 1 gasser on Catletts Creek which was originally a very good producer, and had, it is estimated, about 500,000 cubic feet daily open flow. It has recently been producing according to reports a measured 70,000 cubic feet of gas daily. Sporadic drilling continued with alternating success and failure until 1917-18 when the Ashland Iron and Mining Company, under the superintendency of Mr. J.

C. McCarthy, again undertook a drilling campaign in search of natural gas for industrial purposes. About 10 deep wells were drilled during this period slightly northwest of Ashland and a considerable amount of natural gas varying in estimated open



JESSIE HORN GASSER, NEAR ASHLAND
This is one of a group of gas wells drilled several years ago west and northwest of Ashland by J. C. McCarthy for the A. C. and I. Co. It is still producing.

flow volume from 250,000 to 750,000 cubic feet, with a rock pressure ranging from 700 to 800 lbs. was secured principally in the immediate vicinity of Ashland. This production came for the most part from three gas "sands" in the Devonian shale. This was carefully conserved and piped into Ashland for industrial purposes, where it is still being used though in somewhat diminished volume.

During the period of 1919-1923 a considerable amount of oil and gas prospecting was undertaken by various individuals and local corporations organized for this purpose. The Good Losers Oil and Gas Company extended its development at this time in the Southwestern part of the county on Bolts Fork in the vicinity of Mayhew P. O. With one exception, the H. J. Ross No. 1 well 2,667 feet, these wells were drilled to medium depths of 1,700 to 1,900 feet. This development resulted in the production of about 8 small oil wells in the "Berea" sand. In the eastern part of the county the best producers of this period were the Williams gassers near Lockwood Station on the Big

Sandy River. Production was secured according to reports from a shallow sand, possibly the "Salt Sand," and was accompanied by large volumes of water.

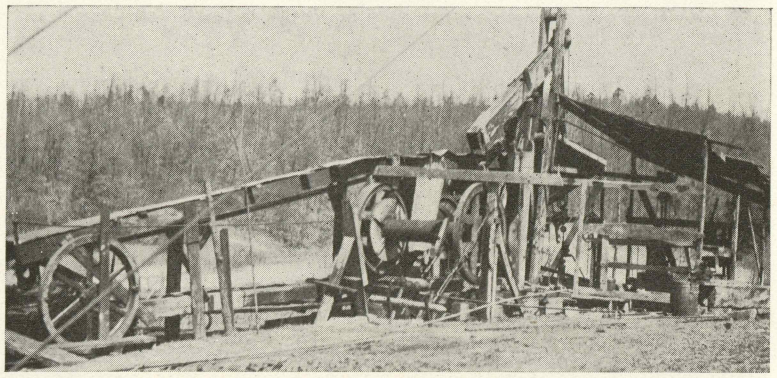
During the last two years, 1924-1925, a very considerable amount of carefully projected oil and gas development has been carried forward in Boyd County by the Summit Oil and Gas Co. and the American Rolling Mill Co., both of Ashland, Kentucky. This exploration has been confined to the Northern part of the county from Laurel Creek northward to the Greenup County line. The main objective of this most recent campaign was commercial amounts of natural gas for industrial purposes. Practically all of these wells, numbering twenty-two, have been drilled through to the bottom of the Devonian shale or into the Corniferous limestone. Fourteen commercial gassers ranging up to about 1,500,000 cubic feet daily volume open flow capacity with rock pressures varying from 650 to 800 lbs., and two oil wells each conservatively estimated at about 5 bbls. are the net results to date. Further drilling is now in progress with the Devonian shale "sands" the principal productive objective.

Summary

A summary of geological conditions and the results of oil and gas drilling up to the present time presents an interesting future for this area. The stratigraphic section exhibits at depths varying from 450 to 2,800 feet, nine possible gas "sands" of which five or six are frequently encountered in an individual well. Two productive oil sands are known. A total of about 73 wells have been drilled in Boyd County, and several wells are now drilling or are in immediate prospect. Of the 73 completed wells 34 were or are commercial gassers, eleven wells were or are small or commercial oil producers, thirteen wells show oil and gas but were not commercial, and fifteen wells were dry holes.

At the present time 60% of the wells drilled have been of commercial importance with certain indications that the region as a whole is a natural gas rather than an oil territory. This conclusion based upon a complete inventory of the production of the entire field is further checked by the occurrence of high carbon ratios in the surface coals. The 60% isocarb enters Boyd County at Savage Station, and looping westward through Gar-

ner crosses portions of eastern Carter and southeastern Greenup counties, where it turns back eastward through Bellefont into Ohio. An outlier of relatively high regional metamorphism, the anamolous cause of which is at present beyond inference, is



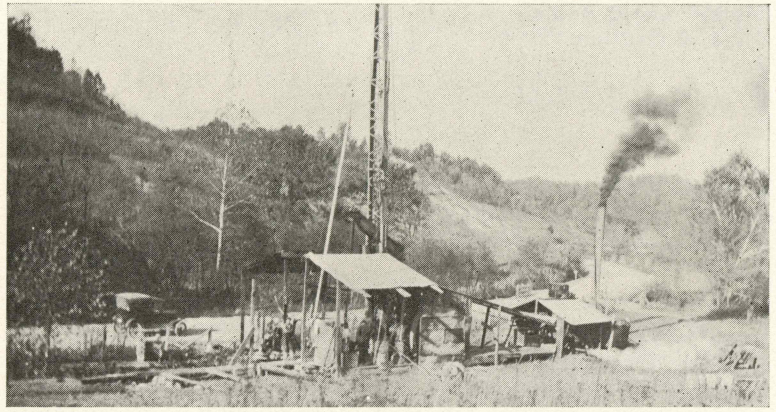
GEORGE FOLEY NO. 1 GASSER
This producing well is located on Hoods Creek one mile north of Summit Station, Boyd County, Ky.

thus indicated for the Northern part of Boyd County. In conclusion it may be said that the Berea sand (Mississippian) and the Ashland gas "sands" (Devonian) are the horizons of greatest expectation and possibility. The rapid industrial and commercial development of the region about Ashland, Catlettsburg, and Russell (Greenup County) indicates that the demand for natural gas for both domestic and industrial use will always be in excess of the locally produced supply. This in turn may be interpreted as an adequate cause for continued prospecting for oil and gas in this region during the next several decades. Detailed studies of the structural position, thickness and porosity of the principal producing oil and gas sands indicate that future prospecting when attended by precise geological work will result in a relatively high number of successful completions as compared to the poor results of much drilling that was completed in this region prior to 1923.

Analyses

Little has been done in the way of testing the petroleum produced in Boyd County. The gravity, however, is of Somerset

grade at all points where analyses have been made of freshly produced samples. Herewith are given analyses of two specimens collected near Summit in Northeastern Boyd County. The grade of the oil in this vicinity is uniformly good. The analyses follow:



A LAUREL CREEK DRILLING
This well located on the Laurel Dome produced considerable gas and some oil from the black shale and Berea sands.

Two samples of petroleum received November 2, 1925, from Dr. W. R. Jillson, State Geologist, Frankfort.

Labroratory No. G-4227—Labeled "Crude petroleum (from well), 1¼ miles southeast of Summit, Boyd County, Ky., American Rolling Mill Co., No. 13, Corniferous sand, depth 2237 ft. Collected by W. R. Jillson, Oct. 28, 1925."

Laboratory No G-4228—Labeled same as preceding, except the note that this sample was "from tank," and "this petroleum had been in tank one week."

No. G-4227—Specific gravity .8596=32.9° B.

	Per Cent by Volume	
Distillate below 150° C. (302° F.)	3	Gasoline fraction
Distillate 150°-300° C. (302°-572° F.)	30	Burning oil fraction
Thick green residue	67	
Total	100	

Sulphur .2% by weight.
Began to distill at 124° C.

No. G-4228—Specific gravity .8625=32.3° B.

	Per Cent by Volume	
Distillate below 150° C. (302° F.)	1.0	Gasoline fraction
Distillate 150°-300° C. (302°-572° F.)	30.7	Burning oil fraction
Residue	68.3	
Total	100.0	

Sulphur .2% by weight.
Began to distill at 140° C.
Nov. 4, 1925.
(Tests by A. M. Peter.)

A M. PETER, Chief Chemist.

SUMMARY OF OIL AND GAS WELLS OF BOYD COUNTY, KENTUCKY, AND VICINITY

Log No.*	Lessor	Lessee	Location	C. H. E.‡	Top Sunbury† Shale	Production
1.	W. A. Patton No. 1. Big Sandy Oil & Gas Co. Catletts Ck.			557.0	823	Gas
2.	Richardson No. 1. 2 mi. S. Catlettsburg			552.0	880	Gas
3.	Bellefonte Brick Co., 2 mi. N. W. Ashland			632.0		Dry
4.	Bellefonte Brick, W. of C. & O. R. R.			545.3	630	Gas
5.	R. Prichard No. 1, 1 mi. N. Kavanaugh Sta.			570.0	1295	Gas
6.	(A. I. & M. Co.) Armco, Shope Ck.			615.8	601	Dry
7.	(A. I. & M. Co.) Armco, ¾ mi. E. Summit			778.5	547	Dry
8.	W. I. Ross No. 1, Bolts Fork			734.8	995	Oil
9.	John Murphy No. 1, Ashland, Ky.			626.3	631	Gas
10.	Belle Ross No. 1, Bolts Fork			685.6	952?	Oil
11.	Clara Williams No. 1, 1¼ mi. W. Lockwood Sta.			663.1	1130	Dry
12.	Lockwood No. 1, Huntington G. & D. Co., Lockwood Sta.			551.0		Dry
13.	Jesse Horn No. 1, Little Hoods Ck.			532.9	644	Gas
14.	(A. I. & M. Co.) Armco, Little Hoods Ck.			537.4	601?	Dry
15.	Westwood Dev. Co., No. 1, Armco, Hoods Ck.			545.4	611?	Gas
16.	Bellefonte Brick Co., Hoods Ck.			577.0	608	Dry
17.	H. & O. Willis No. 1, Armco, Little Hoods Ck.			563.6	619	Gas
18.	Wheatley & Seaton No. 1, Armco, Little Hoods Ck.			650.0	605	Gas
19.	C. J. Bocklage No. 1, Armco, ½ mi. W. Ashland			575.0	640	Gas
20.	B. Shields No. 1, Armco, 1 mi. W. Ashland			606.9	606	Gas
21.	Ashland Fire Brick Co., No. 1, Ashland			557.3	638?	Gas
22.	Ashland Steel Co., No. 1, Ashland			546.4	674	Dry
23.	J. C. Riffe No. 1, Bolts Fork			703.3	963	Oil
24.	Crit Ross No. 1, Southern Boyd Co.			684.9	1074	Oil
25.	Longabaugh No. 1, 600 ft. S. E. Winslow Sta.			586.0		Dry
26.	J. F. Hutchison No. 1, near Summit Sta.			624.9	493	Gas
27.	J. S. Patton No. 1, Keys Creek			548.7		Gas
28.	J. L. Stanley, Indian Run (Greenup Co.)			676.6	469	Dry
29.	W. H. Spears No. 1, Armco No. 1, Laurel Ck.			680.3	753	Gas
30.	Albert Bartram No. 1, Armco No. 2, Chaderick Ck.			726.5	770	Dry
31.	J. M. Ross No. 1, Armco No. 3, Marsh Run			631.5	674	Dry
32.	Pat O'Brien No. 1, Armco No. 4, Laurel Ck.			678.2	724	Dry
33.	J. F. Mason No. 1, Armco No. 5, Shope Ck.			675.4	575	Gas
34.	B. F. Lucas No. 1, Summit O. & G., Hoods Ck.			602.1	492	Gas
35.	G. Fraley No. 1, Summit O. & G., Hoods Ck.			606.7	494	Gas
36.	Ike Fannin No. 1, Kent Millis, et al., Bear Ck.			620.7	1129	Dry
37.	J. H. Elam No. 1, Pet. Ex. Co., Cane Ck. (Greenup Co.)			611.8	no log	Oil
38.	A. Elam No. 1, Pet. Ex. Co., Cane Ck. (Greenup Co.)			628.8	304	Oil
39.	K. Towler No. 1 (no log), Little East Fk.			589.6	446?	Gas
40.	Jack Arthur No. 1, Whites Creek			634.4	G. 1030	Dry
41.	John Haney No. 1, 1 mi. W. of C. & O. Ry., Horse Br.			598.8	G. no log	Dry
42.	Lacy Howard No. 1, Armco No. 17, So. Summit Sta.			695.3	538?	Dry
43.	Cary Fannin No. 1, S. of Bolts Fk. Lawrence Co.			662.7	no log	Oil
44.	H. J. Ross No. 1, ¾ mi. N. Mayhew			868.4	no log	Oil
45.	A. A. Findley No. 1, Bolts Fk.			663.0	no log	Oil

*These well log numbers correspond to the numbers of the various well locations as shown on "Oil and Gas Map of Boyd Co., Ky.," by W. R. Jillson. Ky. Geol. Survey, Series VI, colored. Scale 1:625000, correct to April 1, 1925.
‡All casing head elevations by spirit level, checked.
†Depth below sea level.

Log No.*	Lessor Lessee Location	C. H. E.‡	Top Sunbury† Shale	Production
46.	A. A. Findley No. 2, Bolts Fk.	667.4	no log	Oil
47.	W. A. Patton No. 2, Catletts Ck.	598.0	no log	Dry
48.	Calvin Earle No. 1, Whites Ck.	634.7	no log	Gas
49.	Clara Williams No. —, Lockwood Ck.	654.4	no log	Dry
50.	Clara Williams No. —, Lockwood Ck.	681.2	no log	Gas
51.	Clara Williams No. —. Lockwood Ck.	696.4	no log	Dry
52.	Clara Williams No. —, Lockwood Ck.	727.0	no log	Gas
53.	Clara Williams No. —, Lockwood Ck.	791.5	no log	Dry
54.	Clara Williams No. —, Lockwood Ck.	703.2	no log	Dry
55.	Stanley at Mayhew	717.2	no log	Gas
56.	Herman Lumber Co., Ashland, Ky.	565.0	no log	Dry
57.	Ashland Leather Co., Ashland, Ky.	552.7	no log	Gas
58.	Lewis Skaggs No. 1, Daniels Fork	709.0	409	Dry
59.	Mrs. McCoun No. 1, near Ashland, Ky.	574.8	no log	Dry
60.	Mrs. McCoun No. 2, near Ashland, Ky.	570.3	no log	Dry
61.	Mrs. Maud Cyrus No. 1, Rt. Fk. Durbin Ck.	707.4	G. no log	Oil
62.	Kincaid No. 1, White Oak Ck. (Greenup Co.)	540.1	no log	Dry
63.	Armco No. 15 S. E. Summit Sta.	695.2	585?	Gas
64.	Nando Felty No. 1, Armco No. 16, So. Summit Sta.	691.2	560	Dry
78.	Armco No. 18, 3 mi. W. of Ashland	693.2	shallow	Gas
79.	Armco No. 19, 2½ mi. W. of Ashland	642.5	567	Gas
80.	Armco No. 20, head of Keys Ck.	701.17	601	Gas
81.	Armco No. 21, head of Mason Br.	742.78	577	Gas
102.	S. J. Debord No. 1, Summit Sta., Boyd Co., Ky.	702 Bar	506	Gas
111.	Armco No. 22, 2d bend, Midland Trail, W. Ashland	710.0	576	Gas
112.	J. W. Johnson, No. 1, head Wilson Ck., Carter Co.	671.0	468	Dry
113.	Armco No. 23, head of Keys Ck.	658.6	618	Gas
114.	Armco No. 24, head of Keys Ck.	722.0	619	Gas
115.	Armco No. 25, head of Keys Ck., ¾ mi. S. Winslow Sta.			Gas

REVISED RECORDS FOR OIL AND GAS WELLS DRILLED IN BOYD COUNTY, KENTUCKY, AND VICINITY.

WELL No. 1 (O. & G. Res., p. 217).

W. A. Patton No. 1, lessor (formerly Brown). Big Sandy Oil and Gas Co., lessee. Location Catletts Creek 1½ miles from Catlettsburg, Ky. Orginally a very good well (about 30 years ago). Production in

1924, 80,000 cu. ft. Call Ashland Water Works for drilling time. Gas now used by Catlettsburg Water Works. C. H. E. 557 ft. A. T.

Strata	Thickness	Depth
RECENT		
Soil	36	36
PENNSYLVANIAN SYSTEM		
Sandstone	104	140
Shale, clay	100	240
Sandstone, gray	30	270
Shale	150	420
Sandstone, "Pottsville"	150	570
MISSISSIPPIAN SYSTEM		
Limestone, "Big Lime"	280	850
Sandstone, black	100	950
Sandstone, white—salt water	15	965
Sandstone, black	35	1000
Shale, black—oil show	329	1329
Sandstone, oil	51	1380
Shale, black—"Sunbury"	45	1425
Sandstone, brown—"Berea"	15	1440
Shale and sandstone	5	1445
DEVONIAN SYSTEM		
Shale, black	130	1575
Shale, white	40	1615
Shale, black	180	1795
Shale and shells	50	1845
Limestone, "Sand"—gas	5	1850
Shale, black	10	1860
Sandstone, black	15	1875
Sandstone and shale, black	3	1878
Shale, blue	12	1890
Shale, brown	7	1897
Shale, black	68	1965
Limestone, black—gas—"Gordon"	9	1974
Shale, black	52	2126
Total depth		2126

Note:—"Gordon Sand" was 520 feet in Devonian shale.

WELL No. 2. (O. & G. Res.; p. 218.)

Richardson Well. Location: Two miles south of Catlettsburg. Drilled about 1895. Production: Gas, in use in 1924. C. H. E. 552′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	10	10

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone	50	60
Coal	3	63
Sandstone and shale	167	230
Coal	5	235
Shale	270	505
Sandstone, salt water—gas	205	710
MISSISSIPPIAN SYSTEM		
Limestone, "Big Lime"	270	980
Sandstone	70	1050
Shale	15	1065
Shale and shells	373	1438
Shale, black—"Sunbury"	20	1458
Sandstone, oil—"Berea"	45	1503
Shale	15	1518
Sandstone, dark	10	1528
DEVONIAN SYSTEM		
Shale, black	40	1568
Sandstone, gray	15	1583
Shale and shells	447	2030
Limestone, black—gas—"Gordon"	40	2070
Shale, light	192	2262
Limestone, brown	60	2322
Total depth		2322

Note:—Gordon sand was 502 feet in Devonian Shale.

WELL No. 3. (O. & G. Res., p. 219.)

Bellefonte Brick Co., lessor, No. 1, gas well. Drilled by W. R. Van Sant, et al., lessees. Production: Dry. Drilled about 1910. C. H. E. 632.0′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	9	9
PENNSYLVANIAN SYSTEM		
Limestone	15	24
Shale, blue	126	150
Shale and shells	125	275
Shale, blue	50	325
Limestone	25	350
Shale	15	365
Sandstone—salt water	115	480
Shale—cased at 482	30	510
Sandstone—salt water—"Pottsville'	20	530

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	40	570
Shale	30	600
Sandstone—"Big Injun"	20	620
Limestone and shale	15	635
Shale	70	705
Sandstone	10	715
Shale—cased at 730	475	1190
Shale, brown—"Sunbury"	18	1208
Sandstone—"Berea"*—oil show	112	1320
Shale—sandy (red rock)	20	1340
Shale	20	1360
DEVONIAN SYSTEM		
Shale, brown (Ohio or "Chattanooga")	130	1490
Shale, white (Ohio or "Chattanooga")	35	1525
Shale, brown (Ohio or "Chattanooga")	265	1790
Shale, white (Ohio or "Chattanooga")	80	1870
Shale, brown	110	1980
Shale, Calcareous	35	2015
Shale, brown	10	2025
Limestone, dark	225	2250
SILURIAN SYSTEM		
Limestone, light	125	2375
Shale and shells	40	2415
Limestone, hard white	35	2450
Total depth		2450

WELL No. 4. (O. & G. Res., p. 220.)

Bellefonte Brick Co., lessor. Means and Russell Iron Co., lessee. (Armco No. 1.) Location: Just west of C. & O. R. R. right of way, and near the mouth of Hoods Creek. Drilled 1912. Rock pressure, 700 lbs. when closed in. C. H. E. 545.36 feet A. T. Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil	20	20
PENNSYLVANIAN SYSTEM		
Gravel and Quicksand	44	64
Limestone	11	75
Shale, blue—cased at 134—8¼″	85	160
Limestone, hard	50	210
Shale, blue	170	380
Sandstone, water	20	400

*Only the upper part of this is Berea, the lower part being Bedford.

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, white—cased at 412—6¼"	40	440
Limestone, hard—"Big Lime"	60	500
Shale and lime shell	100	600
Sandstone—"Big Injun"	50	650
Shale, blue—cased at 725—5"	75	725
Shale, sandy	420	1145
Sandstone	30	1175
Shale—"Sunbury"	5	1180
Sandstone—"Berea"	60	1240
DEVONIAN SYSTEM		
Shale, brown—"Chattanooga"	470	1710
Shale and limestone (includes "Gordon")	290	2000
Total depth		2000

WELL No. 5. (O. & G. Res., p. 220.)

Robert Prichard, lessor, No. 1. Location: About one mile north of Kavanaugh Station. Small gasser in 1924, abandoned. Ashland, Ky. C. H. E. 570′ A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, blue	38	38
Gravel	5	43
Shale, blue	20	63
Shale	25	88
Sandstone	20	108
Shale	10	118
Sandstone	50	168
Shale and shells	174	342
Coal	3	345
Shale	27	372
Sandstone and limestone	68	440
Sandstone	45	485
Shale	35	520
Sandstone	55	575
Shale	5	580
Shale, brown—shells	165	745
Sandstone	20	765
Shale, black—shale and shells	79	844
Sandstone	104	948
Shale	30	978
Sandstone	90	1068

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, black	50	1118
Limestone, "Big Lime"	120	1238
Sandstone and shale	187	1425
Shale, dark	440	1865
Shale, black—"Sunbury"	20	1885
Sandstone—"Berea"	40	1925
Shale and shells	40	1965
DEVONIAN SYSTEM		
Shale, dark } "Ohio"	482	2447
Shale, dark } "Ohio"	161	2608
Shale, white } "Ohio"	128	2736
Shale, brown } "Ohio"	49	2785
Limestone—"Corniferous"	95	2880
Total depth		2880

WELL No. 6. (O. & G. Res., p. 221.)

Clinton tract of American Rolling Mill Co. (Ashland Iron and Mining Co., original lessor). Location: Shope Creek. Drilled prior to 1900. Dry hole. C. H. E. 615.8′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	15	15
PENNSYLVANIAN SYSTEM		
Sandstone, gray	10	25
Shale, blue	10	35
Coal	4	39
Shale	31	70
Coal	4	74
Shale	14	88
Sandstone	26	114
Shale, white	56	170
Shale, black—8" casing	65	235
Shale, white	50	285
Coal	3	288
Shale, blue	14	302
Shale, black	113	415
Sandstone, salt water	55	470
Shale	20	490
Sandstone, salt water—"Pottsville"	50	540
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	90	630
Shale	4	634
Sandstone—salt water at 705	131	765

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale—cased at 765	40	805
Sandstone and shale	411	1216
Shale, black—"Sunbury"	14	1230
Sandstone, "Berea"—oil smell	22	1252
Shale—oil smell	10	1262
Sandstone—oil smell	44	1306
DEVONIAN SYSTEM		
Shale, black and white—"Chattanooga"	421	1737
Limestone—"Gordon"	10	1747
Shale, black and white	283	2030
Shale and "Sand"—gas	20	2050
Limestone, brown	50	2100
Total depth		2100

WELL No. 7. (O. & G. Res., p. 222.)

American Rolling Mill Co. (formerly Ashland Coal and Iron Co.), lessor. Location: ¾ of a mile from Summit Station. Well started 52 feet above No. 6 coal and stopped just above the Devonian. Drilled about 1896 by Shea and McMullin for Ashland Coal and Iron Co., original lessor and operator. C. H. E. 778.5′ A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone and shale—"Pottsville"	675	675
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	60	735
Sandstone and shale—"Waverly"	590	1325
Shale, black—"Sunbury"	20	1345
Sandstone, "Berea"—gas	13	1358
Shale, dark	57	1415
Total depth		1415

WELL No. 8. (O. F. Stratig., p. 63.)

W. I. Ross, No. 1, lessor. Good Losers Oil and Gas Co., lessee (oil well No. 3 of lessee). Location: Near Mayhew P. O., Bolts Fork, Boyd County. Commenced: Oct. 1, 1920. Completed: Dec. 14, 1920. Initial production: 25 bbls. oil. C. H. E. 734.84′ A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil and shale	40	40
Sandstone	30	70
Shale and shells	60	130
Coal	3	133

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Limestone (shells)	7	140
Shale (red rock)	12	152
Shale, dark	100	252
Sandstone	75	327
Shale, light	40	367
Limestone, hard	13	380
Shale, dark	10	390
Sandstone, gray—(water at 400)	40	430
Shale and shells	120	550
Limestone, gray	25	575
Shale, dark	125	700
Sandstone, gray	30	730
Shale and shells	90	820
Sandstone, salt water	70	890
Shale, dark	25	915
Sandstone, white	85	1000
MISSISSIPPIAN SYSTEM		
Limestone, gray—"Little Lime"	40	1040
Shale, dark	40	1080
Limestone, hard—"Big Lime"	105	1185
Shale, dark	35	1220
Limestone, gritty	60	1280
Sandstone, gray	40	1320
Limestone, hard	10	1330
Shale, "Waverly"	250	1580
Shale and shells	150	1730
Shale, brown (Sunbury)	27	1757
Sandstone, "Berea" (oil at 20 ft in sandstone. Used 20 qts. nitroglycerine)	35	1792
Shale, dark	32	1824
Sandstone, "Berea" (all carried oil, used 20 qts. nitroglycerine)	6	1830
Shale	36	1866
Total depth		1866

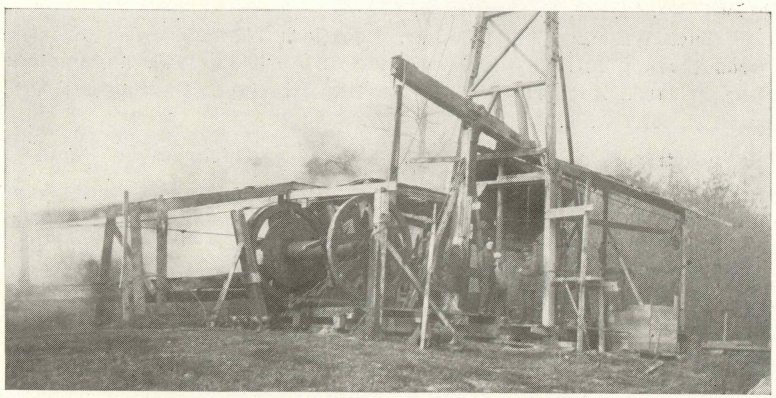
WELL No. 9. (O. F. Stratig., p. 64.)

John Murphy, No. 1, lessor. Murphy Oil & Gas Co., lessee. Location: East side of A. C. & I. Ry. Co. tunnel, just west of Ashland, at Pollard. Commenced: Sept. 14, 1912. Completed: November 15, 1912. Initial production: 500,000 cu. ft. gas. Drilled by Murphy and Abrams. J. L. Gussler, contractor. Authority: C. E. Bales. Production 1924, 80,000 ft. natural gas is reported. Used in Ashland, Ky. C. H. E. 626.30′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	11	11
PENNSYLVANIAN SYSTEM		
Sandstone	70	81
Fire clay	9	90
Shale	50	140
Sandstone	10	150
Shale (fresh water set 8¼" casing at 180)	290	440
"Salt Sand"	20	460
Shale, blue	30	490
Limestone, sandy	18	508
Sandstone, "Salt sand"—gas	60	568
MISSISSIPPIAN SYSTEM		
Limestone	37	605
Limestone, sandy	30	635
Shale, white	15	650
Sandstone	90	740
Limestone, sandy (salt water)	92	832
Shale, soft and muddy	8	840
Shale (set 6⅝" casing at 885)	25	865
Sandstone	45	910
Shale	347	1257
Shale, "Sunbury"	15	1272
Sandstone	5	1277
Sandstone, "Berea" (show of oil)	15	1292
Shale and sandstone	23	1315
Sandstone, gray—gas	33	1348
Shale, blue	35	1383
Shale (red rock)	11	1394
Shale, blue	15	1409
Shale, blue	176	1585
DEVONIAN SYSTEM		
Shale, black—"Chattanooga"	115	1700
Sandstone (fossil shells, gas)	5	1705
Shale, black—"Chattanooga"	200	1905
Sandstone (fossil shells, gas)	5	1910
Shale, black—"Chattanooga"	20	1930
Total depth		1930

WELL No. 10. (O. F. Stratig., p. 66.)

Belle Ross, No. 1, lessor. Good Losers Oil Co. (oil well No. 2, of lessee). Location: Near Mayhew P. O. on Bolts Fork, in Boyd County, just north of Lawrence County line, and about 4½ miles east



A DRILLING ON INDIAN RUN
This well is located on the J. L. Stanley farm. It was drilled in October, 1924, by Wm. Foreman.

of Denton, Carter County. Commenced: June 25, 1920. Completed: Aug. 20, 1920. Initial production: 15 bbls. oil. C. H. E. 685.6′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	20	20
PENNSYLVANIAN SYSTEM		
Shale, black	65	85
Sandstone and limestone	170	255
Shale, white and brown	125	380
Sandstone—(show of gas)	30	410
Sandstone and shale	170	580
Shale, black	200	780
Sandstone, white	175	955
Shale, black	15	970
MISSISSIPPIAN SYSTEM		
Limestone, "Big Injun"	105	1075
Shale, white	108	1183
Sandstone, white—(salt water)	30	1213
Shale, "Waverly"	424	1637
Shale, black "Sunbury"	20	1657
Sandstone, "Berea"—oil	44	1701
Shale, black	8	1709
Sandstone, dark	4	1713
Shale, black	5	1718
Sandstone, "Bedford"—oil	26	1744
Shale, black	7	1751
Total depth		1751

WELL No. 11. (O. F. Stratig., p. 67.)

Clara Williams, No. 1, lessor. Location: 1¼ miles west of Lockwood Station, Ky. Drilling commenced: April 12, 1920. Completed: July 1, 1920. Authority: H. R. Levick, Jr., Supt. Production: Dry. C. H. E. 663.1 A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale and shell	400	400
Sandstone—(cow run)	50	450
Sandstone—(cow run)—(second)	50	500
Sandstone—(salt sand)	610	1110
Shale	10	1120
MISSISSIPPIAN SYSTEM		
Sandstone—"Maxon"	50	1170
Limestone—"Big Lime"	122	1292
Shale, red and blue	40	1332
Sandstone—"Big Injun"—(3 bbls. of water in 24 hrs. at 50 ft.)	200	1532
Shale and shells	326	1858
Shale, black—"Sunbury"	30	1888
Sandstone—"Berea" sand	42	1930
Total depth		1930

WELL No. 12, (O. F. Stratig., p. 68.)

Huntington Gas & Development Co., Huntington, W. Va., No. 1, lessee. Location: At Lockwood Station, near Big Sandy River and C. & O. R. R. right of way, Boyd County, Ky. Drilled about 1916. Production: Dry. Authority: J. C. McCarthy, Ashland, Ky. C. H. E. 551.0' A. T.

Strata	Thickness	Depth
RECENT		
Soil	46	46
PENNSYLVANIAN SYSTEM		
Sandstone	39	85
Shale	10	95
Sandstone	10	105
Shale	20	125
Sandstone	65	190
Shale	10	200
Sandstone	20	220
Shale	20	240
Sandstone	60	300
Shale	227	527
Sandstone	15	542
Shale	274	816

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone—"Salt sand"	224	1040
Coal	2	1042
Shale	18	1060
MISSISSIPPIAN SYSTEM		
Sandstone—"Maxon"	22	1082
Shale	2	1084
Limestone—"Big Lime"	111	1195
Shale	10	1205
Sandstone—"Big Injun"	175	1380
Shale	21	1401
Shale and shells	417	1818
Sandstone—"Berea"	44	1862
Shale and shells	40	1902
DEVONIAN SYSTEM		
Shale, black—"Chattanooga"	758	2660
Shale—"Chattanooga"	86	2746
Limestone—"Sand"—"Ragland"	34	2780
SILURIAN AND ORDOVIAN SYSTEMS		
Limestone	625	3405
Shale	25	3430
Limestone (red rock)	75	3505
Shale, black	95	3600
Limestone—shell	5	3605
Limestone (red rock)	25	3630
Shale, black	15	3645
Limestone, hard—shell	4	3649
Shale and sandstone—shell	41	3690
Shale	5	3695
Limestone—(red rock)	5	3700
Shale, black	15	3715
Limestone	20	3735
Sandstone—broken	15	3750
Shale, black	37	3787
Total depth		3787

Note:—The base of the Devonian, all of the Silurian and the top of the Ordovician occur near the top of the 625 feet of limestone above 3,405 feet in depth.

WELL No. 13.

John Horn, No. 1, lessor. Drilled for the Ashland Iron and Mining Company, original lessee, by J. C. McCarthy, now (1924) American Rolling Mill Co. (No. 2 gasser), Ashland Ky. Rig commenced, Feb. 6, 1917. Completed, Feb. 19, 1917. Drilling commenced, Feb. 20, 1917.

Completed, May 30, 1917. Production in March, 1924, 75,000 cu. ft. natural gas. C. H. E. 532.9′ A. T. Authority: J. C. McCarthy, Ashland, Ky.

Strata	Thickness	Depth
RECENT		
Soil	12	12
PENNSYLVANIAN SYSTEM		
Sandstone	13	25
Fire clay	30	55
Shale	245	300
Sandstone	10	310
Shale	30	340
Sandstone—'Salt sand"	66	406
Shale, black	22	428
MISSISSIPPIAN SYSTEM		
Sandstone—"Maxon"	17	445
Limestone—"Little lime"	19	464
Shale—"Pencil Cave"	56	520
Limestone—"Big lime"	30	550
Shale, black	10	560
Sandstone—water	185	745
Shale, black	401	1146
Sandstone—"Wier"	31	1177
Shale, black—"Sunbury"	10	1187
Sandstone—"Berea"	44	1231
Shale, white	84	1315
DEVONIAN SYSTEM		
Shale, brown ("Ohio")	60	1375
Shale, black ("Ohio")	125	1500
Shale, brown ("Ohio")	160	1660
Shale, gray ("Ohio")	10	1670
Shale, brown ("Ohio")	20	1690
Shale, black ("Ohio")	10	1700
Shale, brown ("Ohio")	35	1735
Shale—"Gordon"	69	1804
Shale, brown	36	1840
Shale, white	133	1973
Limestone—"Corniferous"	512	2485
Shale, black	20	2505
SILURIAN SYSTEM		
Limestone—(red rock)	150	2655
Shale, white	40	2695
Shale, pink	57	2752
Shale, black	18	2770
Limestone—(red rock)	14	2784
Limestone—"Sand"—"Clinton" 2	10	2794

Strata	Thickness	Depth
SILURIAN SYSTEM		
Shale and shells	91	2885
Limestone—(red rock)	45	2930
Shale, blue	6	2936
Total depth		2936

Wood conductor 13′; 10″ casing 205; 8¼″ casing 495; 6⅝″ casing 1194; 3″ tubing 2285. 8¼″ casing pulled.

Remarks:—Show of gas "salt sand" 390. Gas in Berea at 1162. Showing of oil 2049. Gas at 2058.

Water:—Fresh water 2 bbls. hr. 285 ft. Salt water at 350. Hole full of salt water at 400. Water, "Berea Grit" 1150⅛ bbls. per hr.

WELL No. 14.

Open Hearth Well No. 1. Drilled for the Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Owned by American Rolling Mill Co. (No. 3). Rig commenced, July 17, 1917. Completed, July 23, 1917. Drilling commenced, July 23, 1917. Completed, Oct. 5, 1917. Production: Dry, abandoned. Authority: J. C. McCarthy. C. H. E. 537.4′ A. T.

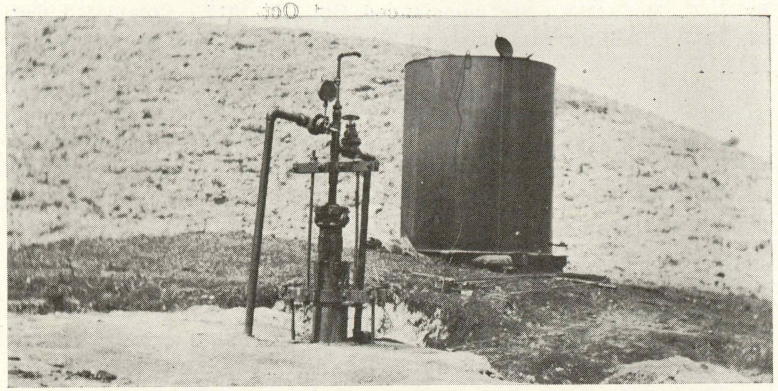
Strata	Thickness	Depth
RECENT		
Soil	12	12
PENNSYLVANIAN SYSTEM		
Shale—soft	13	25
Shale, black	15	40
Sandstone—very soft	8	48
Gravel—fresh water	10	58
Shale, black	52	110
Shale, white	2	112
Shale, black	21	133
Coal	2	135
Sandstone, white	65	200
Mud, blue	8	208
Shale	167	375
Limestone—(red rock)—show of gas 380	40	415
Sandstone—"Salt sand"—salt water 430	20	435
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime"	15	450
Shale—"Pencil Cave"	2	452
Limestone—"Big lime"	128	580
Shale	20	600
Sandstone—"Big Injun"	70	670
Shale	468	1138

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, brown—"Sunbury"	16	1154
Sandstone—"Berea"	30	1184
Shale	6	1190
Sandstone—Bedford	46	1236
Shale	56	1292
DEVONIAN SYSTEM		
Shale, brown ("Ohio")	98	1390
Shale ("Ohio")	15	1405
Shale, brown ("Ohio")	25	1430
Shale ("Ohio")	60	1490
Shale, brown ("Ohio")	10	1500
Shale ("Ohio")	10	1510
Shale, brown ("Ohio")	230	1740
Shale—"Gordon Sand"	40	1780
Shale	60	1840
Shale, brown	155	1995
Limestone—"Corniferous"—show of oil 2085; show of gas 2090; salt water 2100	129	2124
Total depth		2124

WELL No. 15.

Westwood Real Estate and Development Co., No. 1, lessor. Drilled for the Ashland Iron and Mining Company, by J. C. McCarthy. Now owned by the American Rolling Mill Company (No. 4), Ashland, Ky. Rig commenced, Nov. 27, 1917. Completed, Dec. 5, 1917. Drilling commenced, Dec. 27, 1917. Completed, April 23, 1918. C. Head Alt. 545.40 ft. A. T. Production: March, 1923, 106,000 cubic feet natural gas. Authority for log, J. C. McCarthy, Ashland, Ky.

Strata	Thickness	Depth
RECENT		
Soil	38	38
PENNSYLVANIAN SYSTEM		
Shale	30	68
Shale—fresh water 140	285	323
Sandstone	15	338
Shale—salt water 424	20	358
Sandstone—"Salt sand"	66	424
Shale, black	24	448
Sandstone "Maxon"—salt water	16	474
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime"	12	486
Shale—"Pencil Cave"	4	490
Limestone—"Big lime"	30	520
Shale, black	10	530



A HOODS CREEK GASSER
This well is the B. F. Lucas No. 1 and is located ½ mile north of Summit Station, Boyd Co., Ky.

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sandstone, white	127	657
Shale	509	1166
Sandstone—"Berea"—salt water 1180	30	1196
Shale	6	1202
Sandstone—"Berea"	50	1252
Shale	98	1350
DEVONIAN SYSTEM		
Shale, brown—gas 1217 ("Chattanooga" Gas 1660)	25	1375
Shale ("Chattanooga")	125	1500
Shale, brown ("Chattanooga")	100	1600
Shale ("Chattanooga")	60	1660
Limestone—sandy	5	1665
Shale, brown	90	1755
Limestone and shells	5	1760
Shale, brown—gas 1685	100	1860
Shale, white	140	2000
Shale, brown	7	2007
Limestone—"Corniferous"	15	2022
Total depth		2022

Wood conductor 16′; 12½″ 34′ 6″; 10″ casing 212′ 8″; 8¼″ casing 468′ 2″; 6⅝″ casing 1218′ 4″; 3″ tubeing 1996′ 9″; 8¼″ casing pulled Lost bit stem and jars in hole.

WELL No. 16.

Bellefonte Brick Co., No. 1, lessor. Location: Bellefonte farm. Drilled for Ashland Iron and Mining Company (Armco No. 5), lessee,

by J. C. McCarthy. Rig commenced Oct. 10, 1917. Completed Oct. 23, 1917. Drilling recommenced Oct. 24, 1917. Completed Feb. 23, 1918. Production: Small show of gas in "Berea" and "Gordon" sands; abandoned. Well abandoned. C. H. E. 577.0′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	14	14
PENNSYLVANIAN SYSTEM		
Shale	6	20
Coal	2	22
Sandstone	56	78
Shale, soft, blue	71	149
Sandstone, white—fresh water 175	35	184
Shale, soft, blue	31	215
Sandstone, white	5	220
Shale, black	38	258
Sandstone	7	265
Shale	5	270
Sandstone	20	290
Shale	10	300
Sandstone—"Salt sand"—gas 310′	150	450
Shale	2	452
MISSISSIPPIAN SYSTEM		
Limestone, "Little lime"	15	467
Shale, "Pencil Cave"	3	470
Limestone, "Big lime"	50	520
Shale	95	615
Sandstone	145	760
Shale	398	1158
Sandstone	26	1184
Shale—"Sunbury"—salt water	7	1191
Sandstone—"Berea"—show of gas 1195′	109	1300
DEVONIAN SYSTEM		
Shale, brown	25	1325
Shale and shells	432	1757
Limestone—"Gordon"	25	1782
Shale, brown	28	1810
Limestone, brown	40	1850
Shale, white	131	1981
Limestone—"Corniferous"	210	2191
Total depth		2191

Conductor 14′; 10″ casing 210′ 1″; 8¼″ casing 467′; 6⅝″ casing 1231′ 8″; 5 3/16″ casing 1770′ 11″. All casing pulled except wood conductor and 10″.

WELL No. 17.

C. H. & Otis Willis, Well No. 1, lessor. Drilled for Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Now property of American Rolling Mill Co., Ashland, Ky. Location: ¼ mile north of C. & O. R. R. right of way 8½ miles west of lower part of Ashland, Ky. Rig commenced May 14, 1918. Completed May 25, 1918. Drilling recommenced June 6, 1918. Completed July 3, 1918. Production: Natural gas, April, 1924, 281,000 cu. ft. C. H. E. 563.63 feet A. T.

Strata	Thickness	Depth
RECENT		
Soil	10	10
PENNSYLVANIAN SYSTEM		
Fire clay	5	15
Shale	25	40
Coal	2	42
Shale	38	80
Sandstone—fresh water	10	90
Shale	30	120
Shale, soft, blue	30	150
Shale	10	160
Coal	2	162
Shale	26	188
Coal	2	190
Shale	175	365
Sandstone—"Salt sand"—water 470′	115	480
Shale	9	489
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime"	18	507
Shale—"Pencil Cave"	2	509
Limestone—"Big lime"	116	625
Shale	557	1182
Shale, brown—"Sunbury"	20	1202
Sandstone, "Berea"	26	1228
Shale	6	1234
Sandstone—"Berea"—gas at 1236′	35	1269
DEVONIAN SYSTEM		
Shale	131	1400
Shale, brown	240	1640
Limestone, shells—show of gas	5	1645
Shale	159	1804
Shale, brown	54	1858
Limestone, black—gas	12	1870
Shale	45	1915

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone, shell—gas	5	1920
Shale, white	114	2034
Limestone—"Corniferous."		
Total depth		2034

Conductor 32′; 10″ casing 199′ 6″; 8¼″ casing 531′ 11″; 6⅝″ casing 1244′; 3″ tubing 2056′ 11″; 8¼″ casing pulled 531′ 11″.

WELL No. 18.

Wheatley and Seaton, Well No. 1, lessor. Location: One mile west of Ashland, Ky. Drilled for Ashland Iron and Mining Company (Armco No. 7), lessee, by J. C. McCarthy of Ashland, Ky. Rig commenced Aug. 1, 1918. Completed Aug. 17, 1918. Drilling commenced Aug. 20, 1918. Completed Oct. 28, 1918. Production: This well made when flush, 2 bbls. oil for 30 days actual pumping, and 150,000 cu. ft. gas. C. H. E. 650.0′ A. T. Authority for log, J. C. McCarthy, Ashland, Ky.

Strata	Thickness	Depth
RECENT		
Soil	22	22
PENNSYLVANIAN SYSTEM		
Sandstone	23	45
Shale	45	90
Coal	2	92
Shale	33	125
Fire clay	5	130
Coal	5	135
Shale	20	155
Sandstone—water	55	210
Shale, black—10″ casing	5	215
Shale and shells	185	400
Sandstone	20	420
Shale	15	435
Sandstone—"Salt sand"—salt water 450-480	95	530
Shale, black	20	550
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime"—8¼ casing 568′	110	660
Shale	20	680
Sandstone	40	720
Shale	40	760
Sandstone	40	800
Shale	20	820
Sandstone	30	850
Shale and shells	405	1255

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, brown—"Sunbury"	15	1270
Sandstone—"Berea"	28	1298
Shale	8	1306
Sandstone—"Berea" 6⅝″ casing 1339′	79	1385
Shale, pink	25	1410
DEVONIAN SYSTEM		
Shale, brown	110	1520
Shale, gray	30	1550
Limestone, shells	10	1560
Shale, brown	222	1782
Shells	18	1800
Limestone, shells—show of gas	20	1820
Shale, white	15	1835
Shale, brown	65	1900
Shale, red	45	1945
Sandstone, "Gordon"—show of gas	25	1970
Shale, white	65	2035
Limestone, shells	5	2040
Shale, white	56	2096
Limestone—"Corniferous" gas and oil 2166′	158	2254
Total depth		2254

Well shot with 80 quarts.

Wood conductor 22′; 10″ casing 220′; 8¼″ casing 569′ 7″; 6⅝″ casing 1334′. 8¼″ casing pulled 569′ 7″.

WELL No. 19.

C. J. Bocklage, Well No. 1, lessor. Drilled for Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Now property of American Rolling Mill Co. (No. 8). Rig commenced Aug. 16, 1918. Completed Aug. 22, 1918. Drilling recommenced Aug. 29, 1918. Completed Oct. 12, 1918. Production: Original, 250,000 cu. ft. gas. In April, 1924, this well produced 125,000 cu. ft. natural gas. C. H. E. 575.0 feet A. T.

Strata	Thickness	Depth
RECENT		
Soil	10	10
PENNSYLVANIAN SYSTEM		
Clay	5	15
Sandstone—rock	3	18
Quick sand	2	20
Shale	40	60
Sandstone—fresh water 77′	40	100
Shale	150	250
Mud, blue	100	350

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone—"Salt sand"—water at 470'	130	480
Shale	47	527
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime"	10	537
Shale——"Pencil Cave"	4	541
Limestone"Big lime"	259	800
Shale, white	415	1215
Shale, brown—"Sunbury"	10	1225
Sandstone—"Berea"	30	1255
Shale—gas 1270'	7	1262
Sandstone—"Berea"	50	1312
Shale	88	1400
DEVONIAN SYSTEM		
Shale, brown } "Ohio"	100	1500
Shale } "Ohio"	260	1760
Shale, blue—gas at 1760'	5	1765
Shale	115	1880
Shale, brown } "Chattanooga"	88	1968
Shale, white } "Chattanooga"	97	2065
Limestone—"Corniferous"—oil and gas show 2155'	134	2199
Total depth		2199

Drive pipe 13½" 20'; casing 10" 175' 4"; 8¼" 566'; casing 1274' 3"; tubing 2040'.

WELL No. 20.

B. Shields, Well No. 1, lessor. Location: Western suburbs of Ashland, Ky., in Midland Heights addition. Drilled for Ashland Iron and Mining Company, lessee, by J. C. McCarthy. Now property of American Rolling Mill Co. (No. 9). Rig commenced Nov. 21, 1918. Completed Dec. 10, 1918. Started spudding Dec. 12, 1918. Well completed to 2178' Feb. 13, 1919. Well finished through "Clinton" sandstone June 12, 1919, at 3052'. Production: Natural gas, in April was 50,000 cu. ft. C. H. E. 606.88 feet A. T.

Strata	Thickness	Depth
RECENT		
Soil	12	12
PENNSYLVANIAN SYSTEM		
Sandstone, rock—fresh water at 18'	8	20
Fire clay	20	40
Shale, black	15	55
Coal—hole full of water	5	60
Shale	15	75

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, soft, blue	150	225
Shale, black	125	350
Sandstone, white	50	400
Shale, black	85	485
Sandstone, "Salt sand" white—Big water at 500'	43	528
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime"	94	622
Shale, black	158	780
Sandstone, white	290	1070
Limestone, gray—shells	30	1100
Shale, black	113	1213
Shale, brown—"Sunbury"	15	1228
Sandstone—"Berea"—gray	27	1255
Shale, black	10	1265
Sandstone—"Berea"—gas at 1290'	60	1325
Shale, sandy (red rock)	30	1355
DEVONIAN SYSTEM		
Shale, brown—"Chattanooga"	245	1600
Shale, white	20	1620
Shells, brown—show of gas 1700'	157	1777
Shale, white	21	1798
Limestone, brown	24	1822
Shale, white	8	1830
Shale, brown	90	1920
Shale, white	148	2068
Limestone—"Corniferous"—gas at 2155'	97	2165
SILURIAN SYSTEM		
Limestone—"Niagran"	429	2594
Shale, pink, red—water at 2178'	274	2868
Limestone, "Clinton"—light gray—reduced hole to 5 3/16 at 2576'	10	2878
Shells, gray	90	2968
Shale, dark red	84	3052
Total depth		3052

Wood conductor 12'; 10" casing, 9 joints 176'; 8" casing, 26 joints 548'; 658" casing, 61 joints 1258'.

Note:—The Devonian-Silurian contact, as indicated, is conjectural.

WELL No. 21.

Ashland Fire Brick Co., lessor and lessee. Well No. 1. Location: Ashland Fire Brick Company yards, at Ashland, Ky. Drilled: April, 1912. Production: Natural gas, at 1373 ft. C. H. E. 557.3' A. T.

Strata	Thickness	Depth
RECENT		
Sand, gravel	15	15
Drive pipe	70	85
PENNSYLVANIAN SYSTEM		
Shale, blue	265	350
Sandstone—water	25	375
Sandstone	30	405
Sandstone—salt water	50	455
Sandstone—no salt	75	530
Shale, blue	10	540
MISSISSIPPIAN SYSTEM		
Limestone	55	595
Shale	65	660
Sandstone—"Big Injun"	45	705
Shale	490	1195
Shale—"Sunbury"—show of oil	22	1217
Shale	8	1225
Sandstone } "Berea"	30	1255
Sandstone, natural gas } "Berea"	18	1273
Gas	17	1290
Total depth		1290

8¼" casing 169 ft. 6½" casing 540 ft. 5" casing 737 ft.

WELL No. 22.

Ashland Steel Co., lessor and lessee. Location: Ashland Steel Company's yards, close to Ohio River, Ashland, Ky. Production: Dry. C. H. E. 546.4′ A. T.

Strata	Thickness	Depth
RECENT		
Soil—sand—(10" casing)	74	74
PENNSYLVANIAN SYSTEM		
Sandstone, shale (8¼" casing)	236	310
Sandstone	148	458
Sandstone—salt water	60	518
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime"	16	534
Shale—"Pencil Cave"	5	539
Limestone—"Big lime"	56	595
Shale	65	660
Sandstone } "Big Injun"	10	670
Sandstone, water } "Big Injun"	40	710
Shale—5" casing	20	730
Shale and shells—"Waverly"	510	1240
Sandstone—"Berea"—little water	5	1245

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale (15 ft. break, 3 ft. gas)	18	1263
Sandstone—no pay	25	1288
Sandstone—of pay	10	1298
Sandstone	2	1300
Shale, white	1	1301
Total depth		1301

Note:—Cased in "Big lime" at 558 A 5-foot break occurs at 570. Packer to be set 46 ft. above bottom. This record seems to have been poorly kept.

WELL No. 23.

J. C. Riffe, No. 1, lessor. Good Losers Oil & Gas Co., lessee. Location: ½ mile southwest of Mayhew P. O., Bolts Fork, Boyd Co., Ky. Commenced March 24, 1920. Authority: John Diedrich, Ashland, Ky. C. H. E. 703.27 feet A. T.

Strata	Thickness	Depth
RECENT		
Soil, clay (35′ of 10" casing)	35	35
PENNSYLVANIAN SYSTEM		
Shale	65	100
Sandstone—broken	175	275
Shale, white and brown	125	400
Sandstone, white—gas	30	430
Shale, broken sand	170	600
Shale, black	200	800
Sandstone, white—gas	175	975
Shale, black—6⅝" casing	15	990
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime"	132	1122
Shale, white	108	1230
Sandstone, white—"Big Injun"	30	1260
Shale—"Waverly"	440	1666
Shale, black—"Sunbury"	20	1686
Sandstone—"Berea"—oil 14 ft in "sand"	47	1733
Shale, black	9	1742
Sandstone, dark	5	1747
Shale	6	1753
Sandstone—"Berea"	23	1776
Shale	7	1783
Total depth		1783

Note:—Should be cased through the "Big Injun" sand, as this sand contains salt water in this locality. Should be 125 ft. of 8 inch used to cut off the upper water and cave.

WELL No. 24.

Crit Ross, No. 1, lessor. Good Losers Oil Co., lessee. Location: Southern Boyd County, ½ mile east of Mayhew on Bolts Fork. Partial record only. Authority: John Diedrich. C. H. E. 684.9′ A. T.

Strata	Thickness	Depth
PENNSYLVANIAN AND MISSISSIPPIAN SYSTEMS		
Sandstone, limestone and shale	1757	1757
Sandstone—"Berea"	35	1792
Shale	32	1824
Sandstone—"Berea"	6	1830
Shale	26	1836
Total depth		1836

WELL No. 25. (O. & G. Res. p. 222.)

Longabaugh, No. 1, lessor. Location: 600 feet southeast of Winslow Station, 2 miles west of Ashland, Ky. This is an old well, the location of which is now entirely obliterated. It produced a very small amount of natural gas according to report. The level of the ground at the exact location in a garden is 586.0′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	14	14
PENNSYLVANIAN SYSTEM		
Shale	10	24
Sandstone, white	38	62
Shale	28	90
Sandstone	48	138
Shale	38	176
Sandstone	20	196
Shale, black	110	306
Sandstone—salt water	83	389
Shale	15	404
Sandstone	20	424
Shale	15	439
Sandstone—salt water	61	500
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime"	50	550
Shale and sandstone—salt water at 698	532	1082
Total depth		1082

WELL No. 26.

J. F. Hutchinson, No. 1, lessor. Summit Gas & Oil Co., lessee. Location: On the head of Hood's Creek, at Summit Station just north of C. & O. R. R., five miles west of Ashland, Ky. Commenced April 15, 1924. Completed June 20, 1924. Drilled by Forman and Hurt, for the Summit Gas & Oil Co. Authority: W. R. Forman. Production: 5 bbls. oil per day on pump and 250 cu. ft. natural gas. C. H. E. 624.9′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	17	17
PENNSYLVANIAN SYSTEM		
Shale	73	90
Sandstone, gray	30	120
Shale, blue	12	132
Sandstone	12	144
Shale, white	10	154
Coal	4	158
Shale, white	15	173
Sandstone	35	208
Shale, blue	82	290
Sandstone, white	20	310
Shale	45	355
Sandstone, white	30	385
Shale	45	430
Sandstone—"salt sand"	50	480
Shale	6	486
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime"	59	545
Shale, brown	24	569
Limestone, blue	6	575
Shale, white	15	590
Sandstone—"Big Injun"—(water at 630)	95	685
Shale	7	692
Limestone, shells	8	700
Sandstone, blue	43	743
Limestone, shells	10	753
Sandstone, blue	17	770
Shale—"Waverly"	347	1117
Shale—"Sunbury"	13	1130
Sandstone—"Berea"	85	1215
DEVONIAN SYSTEM		
Shale, white	35	1250
Shale, brown—"Chattanooga"	94	1344
Shale, white	101	1445
Shale, brown—"Chattanooga"	145	1690
Shale, white	112	1802
Shale, brown—"Chattanooga"	13	1815
Shale, white	115	1930

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone—"Corniferous"	60	1990
Limestone—oil	15	2005
Limestone	8	2013
Limestone—oil	14	2027
SILURIAN SYSTEM		
Limestone	151	2178
Total depth		2178

Shot well with 120 qts. Production: Pumped 5 bbls. per day.

WELL LOG No. 27.

J. S. Patton, No. 1, lessor. Summit Gas & Oil Co., lessee. Location: On Keys Creek, Boyd Co., Ky., near city limits of Ashland and 1½ miles from Catlettsburg. Commenced: July 15, 1922. C. H. E. 548.7′ A. T. Production: Original 500,000 cu. ft. gas drowned by strong flow of salt water due to small amount of casing.

Strata	Thickness	Depth
RECENT		
Soil	15	15
PENNSYLVANIAN SYSTEM		
Clay	5	20
Sandstone	5	25
Sand	18	43
Fire clay	7	50
Coal	3	53
Shale	7	60
Sandstone	40	100
Shale	150	250
Fire clay	100	350
Shale	130	480
Sandstone (salt sand), salt water, gas	45	525
MISSISSIPPIAN SYSTEM		
Shale	2	527
Limestone	10	537
Sandstone, black	4	541
Sandstone, gray	33	574
Limestone (Big lime)	226	800
Shale, white	415	1215
Shale brown	10	1225
Shale, black (Sunbury)	37	1262
Sandstone (Berea), show of oil	36	1298
Sandstone (Berea), black, coarse,—oil, gas, water	6	1304
Shale, limey, black	57	1361
Shale	89	1450

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, brown	100	1550
Shale, black	232	1782
Limestone, blue—gas	9	1791
Shale	112	1903
Shale, brown	185	2088
Sand, black—gas	17	2105
Sand, gray	45	2150
Limestone, sandy (Corniferous), gas at 2160	31	2181
Total depth		2181

This well was drilled 2181 feet, gas was found in four different sands, the best gas was found at 2105 feet.

Good show of oil in the Berea sand at a depth of 1298 feet.

Packer was set 525 feet from bottom of hole, with a two-inch tubing to case the water off.

T. A. Malone, Contractor.

WELL No. 28.

James Lee Stanley, lessor. W. R. Forman, et al., lessees. Location: Head waters of Indian Creek, in Greenup County, Ky., 1½ miles from Boyd County line. Production: Small oil in Berea sand and small gas in Bedford. C. H. E. 676.6′ A. T.

(Partial record.)

Strata	Thickness	Depth
RECENT AND PENNSYLVANIAN SYSTEM		
Soil, sandstone, shale and coals	487	487
MISSISSIPPIAN SYSTEM		
Limestone—"Big lime"	59	556
Sandstone and shale—"Waverly"	594	1150
Shale, black "Sunbury"	16	1166
Sandstone—"Berea"—oil	87	1253
Sandstone—"Bedford"—gas	8	1261
Incomplete depth		1261

WELL LOG No. 29.

W. H. Spears, No. 1, lessor. The American Rolling Mill Company, Ashland, Ky., No. 1, lessee. Location: 5 miles southwest of Catlettsburg, Ky., on Laurel Creek, Boyd County, Kentucky. Commenced: Sept. 23, 1924. Completed: Oct. 25, 1924. Casing head elevation 680.3 feet, A. T. John G. White, Ashland, Ky., contractor. Production: 3 bbls. oil and 250,000 cu. ft. natural gas.

Strata	Thickness	Depth
RECENT		
Soil	12	12
PENNSYLVANIAN SYSTEM		
Fire clay	3	15
Sandstone	11	26
Fire clay	2	28
Coal (water)	2	30
Sandstone	15	45
Quicksand (large, fresh water)	3	48
Shale, sandy	25	63
Coal	2	65
Shale, sandy	22	87
Sandstone	13	100
Shale, white	94	194
Sandstone	15	209
Shale, black	4	213
Sandstone	44	257
Shale, white, muddy	3	260
Sandstone	18	278
Coal	3	281
Shale, sandy	11	292
Shale, white, muddy	8	300
Shale, sandy	10	310
Shale, dark	65	375
Sandstone	42	417
Shale, black	13	430
Sandstone	28	458
Shale, dark	13	471
Sandstone	40	511
Shale, light, muddy	95	606
Sandstone, "Salt"	46	652
Shale	4	656
MISSISSIPPIAN SYSTEM		
Limestone—"Little lime"	12	668
Limestone—"Little lime"—broken	13	681
Sandstone, pebbles	36	717
Shale	5	722
Sandstone, pebbles	6	728
Fire clay (10" steel line)	1	729
Limestone—"Big Lime"	82	812
Sandstone—"Big Injun"	17	829
Red rock	4	833
Sand stone—"Squaw"—(Briney salt water at 875, 4 bbls. per hour)	127	960
Shale, sandy	60	1020
Shale, dark	112	1132

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, light	122	1254
Shale, sandy	22	1276
Shale, dark	117	1393
Shale, light	40	1433
Shale, brown—"Sunbury"—(steel line)	18	1451
Sandstone—"Berea"—oil at 1451	15	1466
Sandstone, broken—"Berea"	74	1540
DEVONIAN SYSTEM		
Shale, light	35	1575
Shale, black	90	1665
Shale, light	22	1687
Shale, black	15	1702
Fire clay	20	1722
Shale, white	63	1785
Shale, black	195	1980
Shale, gray	18	1998
Shale, black (gas 2029-2047) (steel line 2029)	69	2067
Shale, light	7	2074
Shale, white	56	2130
Shale, dark, sandy (steel line)	154	2284
Limestone—"Corniferous"—flinty, sandy lime (strong odor, oil)	25	2309
Limestone, oil at 2349 (steel line)	43	2352
Limestone, broken	70	2422
Total depth		2422

WELL LOG No. 30.

Albert Bartram, No. 1, lessor. American Rolling Mill Company, Ashland, Ky., No. 11 (W-2), lessee. Location: 5 miles S. W. of Catlettsburg, Ky., on head of left fork of Chaderick Creek, Boyd County, Ky. Casing head elevation 726.5 feet. Begun: Nov. 20, 1924. Completed: Jan. 25, 1925. John G. White, Ashland, Ky., contractor. Production: Small gas in Corniferous, well bungled in shooting, plugged and abandoned.

Strata	Thickness	Depth
RECENT		
Soil	8	8
PENNSYLVANIAN SYSTEM		
Sand	6	14
Fire clay	9	23
Shale, dark	6	29
Shale—"Red Rock"	4	33

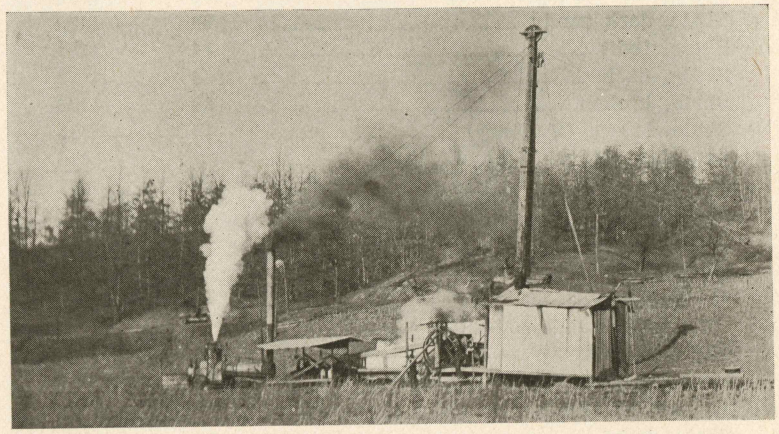
Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Fire clay	17	50
Shale, dark	12	62
Fire clay	16	78
Lime	3	81
Sand, dark	29	110
Shale, muddy	9	119
Shale, light	20	139
Shale, muddy	27	166
Shale, dark	23	189
Shale, muddy	19	208
Coal—water	3	211
Shale, muddy	11	222
Sand, light—gas, 224	11	233
Shale, dark	4	237
Shale, light	11	248
Sand, light	38	286
Shale, muddy	5	291
Sand, dark	49	340
Shale, light	33	373
Shale, muddy	8	381
Sand, dark	23	404
Sand, white (water)	32	436
Shale, muddy	93	529
Shale, gray	19	548
Shale, muddy	11	559
Sand, broken	3	562
Shale, muddy	58	620
Shale, muddy and lime	12	632
Shale, muddy	20	652
Sand, light	2	654
MISSISSIPPIAN SYSTEM		
Limestone—"Little Lime"	13	667
Shale, light } Gas at 690 {	7	674
Sand, light } Gas at 690 {	31	705
Shale, light (salt water)	45	750
Shale, dark, sandy	7	757
Shale, muddy	3	760
Sand, light	5	765
Shale, dark	2	767
Sand, light	17	784
Shale, dark (steel line run 793 feet, 8¼ inch casing)	6	790
Limestone	4	794
Shale, light	35	829
Limestone—"Big Lime"	76	905

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sandstone—"Big Injun"—(Salt water at 908, ¾ bbl. per hour)	9	914
Shale, red	2	916
Sandstone—"Squaw Sand"	109	1025
Shale, dark sandy	85	1110
Shale, light	44	1154
Shale, dark	304	1458
Shale, broken	38	1496
Shale, brown (Sunbury)	19	1515
Sandstone (Berea) (steel line)		1515
Sandstone (Berea)	18	1533
Shale, dark sandy	4	1537
Sandstone	18	1555
Shale	3	1558
Sandstone (oil)	35	1593
Sandstone	2	1595
Shale, dark, sandy	3	1598
Limestone, shelly	10	1608
DEVONIAN SYSTEM		
Shale, light	14	1622
Shale, black	116	1738
Shale, gray	29	1767
Shale, black	8	1775
Shale, dark	63	1838
Shale, black	5	1843
Limestone, black (reduced hole from 8 to 6½ at 1848)	8	1851
Shale, black, slightly calcareous	99	1950
Shale, brown	112	2062
Shale, light	12	2074
Shale, black	54	2128
Shale, light	27	2155
Shale, black	59	2214
Shale, light	8	2222
Fire clay	6	2228
Shale, light	31	2259
Fire clay	21	2280
Shale, light	19	2299
Shale, dark (steel line)	55	2354
Limestone—"Corniferous"—(Natural gas)	96	2450
Total depth		2450

Note:—This well did not produce gas in the Devonian black shale. The Ashland gas sand producing in the nearby, W. H. Spears No. 1 well, on Laurel Creek was not recognized in this well.

WELL No. 31.

J. M. Ross, No. 1, lessor. The American Rolling Mill Company, Ashland, Ky., No. 12 (W-3), lessee. Location: Eleven miles southeast of Ashland, Kentucky, on Marsh Fork of Little Sandy River, Boyd



Portable Rig on J. M. Ross Farm

County, Ky. 631.54′ A. T. Commenced: Jan. 20, 1925. Completed: Feb., 1925. John G. White, Ashland, Ky., contractor. Production: Dry.

Strata	Thickness	Depth
RECENT		
Soil	10	10
PENNSYLVANIAN SYSTEM		
Shale	15	25
Sandstone (water)	40	65
Shale, light	10	75
Shale, dark	10	85
Shale, gray	5	90
Shale, light	10	100
Coal	1	101
Shale, light	23	124
Shale, sandy	36	160
Shale, light	29	189
Coal	2	191
Shale, dark (big water)	4	195
Shale, sandy	45	240
Shale, dark	35	275
Shale, light	25	300
Shale, sandy—gas at 321′	53	353
Shale, dark	127	480

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone	125	605
Shale, light—4″ steel line	6	611
MISSISSIPPIAN SYSTEM		
Limestone (Big Lime), 8¼ casing 637′	103	714
Shale, dark	5	719
Shale, dark—gas 719′ to 725′	6	725
Limestone, white, sandy	6	731
Shale, dark	5	736
Shale, dark (red rock)	4	740
Sandstone (Big Injun) (salt water 832)	116	856
Shale, light, 6⅝ casing 856′	14	870
Limestone, shells	28	898
Shale, light	7	905
Shale and shells	55	960
Shale, dark	220	1180
Shale, sandy	40	1220
Shale, light	85	1305
Shale (coffee) "Sunbury"	16	1321
Sandstone, Berea, show oil 1321′	20	1341
Shale, dark	3	1344
Sandstone—"Bedford"—gas at 1368′	77	1421
DEVONIAN SYSTEM		
Shale, black	189	1610
Shale, light	70	1680
Shale, black	195	1875
Shale, gray	15	1890
Shale, black	134	2024
Shale, white (still in white, show at 2075′)	114	2138
Limestone (Corniferous)	194	2332′ 6″
Total depth		2332′ 6″

The above well was plugged as follows: Bridges at 2163, season plug three feet long to 2150, filled in nine feet to 2141, season plug three feet to 2138 corniferous limestone.

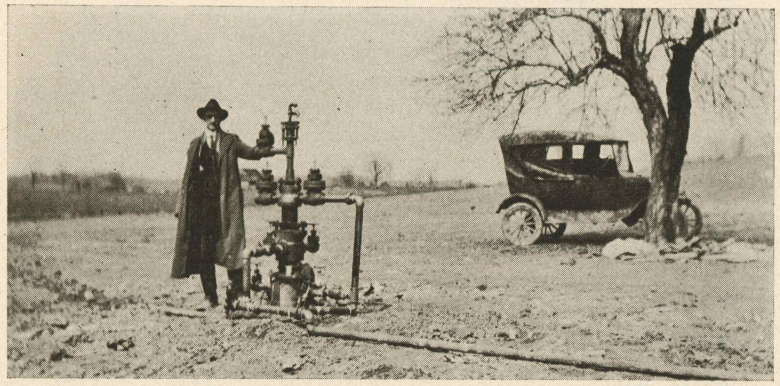
WELL No. 32.

Pat O'Brien, No. 1, lessor. The American Rolling Mill Co., Ashland, Ky., No. 13 (W-4), lessee. Location: Six miles south of Catlettsburg, Ky., on O'Brien Branch of Laurel Creek, Boyd County, Ky. Casing head elevation 678.2′ A. T. Commenced: Feb. 16, 1925. Completed: March, 1925. Production: Small gas, plugged and abandoned. John G. White, Ashland, Ky., contractor.

Strata	Thickness	Depth
RECENT		
Soil and gravel—wood conductor	8	8

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, blue	5	13
Sandstone	8	21
Fire clay	21	42
Coal (water)	1	43
Fire clay	17	60
Shale, sandy	23	83
Coal	2	85
Shale, light	7	92
Shale, dark	53	145
Sandstone	40	185
Shale, light	12	197
Sandstone	43	240
Shale, dark	5	245
Shale, light—big water 255′	34	279
Sandstone —10″ casing 265′ 2″	30	309
Shale, dark	10	319
Sandstone	8	327
Shale, dark	26	353
Shale, sandy	8	361
Sandstone	13	374
Shale, dark	23	397
Shale, light—gas 423′	26	423
Shale, light	29	452
Sandstone, gray	23	475
Shale, light	17	492
Shale, dark	30	522
Sandstone, white—little gas 525′	153	675
Shale, gray—little water 545	5	680
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"—big water 573′	102	782
Limestone, brown—8¼″ casing 726′ 5½″	20	802
Sandstone—"Big Injun"—engine gas 802′	22	824
Shale—"Red Rock"	5	829
Sandstone—"Big Injun"—little water 884′	113	942
Shale, sandy—948 ft., 6⅝″ casing	78	1030
Shale, light—bottom hole packer and anchor	20	1050
Shale, dark—packer set at 827′	351	1401
Shale—"Sunbury"	19	1420
Sandstone "Berea"	15	1435
Sandstone, broken "Berea"	95	1530
DEVONIAN SYSTEM		
Shale, light	10	1540
Shale, brown	95	1635
Shale, light	20	1655
Shale, black	15	1670

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, light	35	1705
Shale, brown	240	1945
Shale, light	28	1973
Shale, brown	132	2105
Shale, light	141	2246
Limestone, Corniferous		2246
Total depth		2246



MASON NO. 1 GASSER, NEAR ASHLAND
This remarkable well produced from the Salt Sand, the Big Injun Sand, and the Ashland Gas Sand. It is one of the best gas wells in Boyd County, Ky.

WELL No. 33.

John F. Mason, No. 1, lessor. The American Rolling Mill Co., Ashland, Ky., No. 14 (W-5), lessee. Location: Six miles from Ashland, Ky., on the Midland Trail, Boyd Co., Ky. Commenced: Feb. 19. Completed: March, 1925. 675.4′ A. T. John G. White, Ashland, Ky., contractor. Production: Large gasser.

Strata	Thickness	Depth
RECENT		
Soil and gravel (wood conductor)	12	12
PENNSYLVANIAN SYSTEM		
Shale, blue—water enough to drill with	8	20
Fire clay	10	30
Sandstone, hard	8	38
Coal	2	40
Shale, dark	15	55
Shale, light	15	70
Shale, dark	30	100

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, light	20	120
Coal	1	121
Shale, dark	29	150
Shale, light—big water 168′	85	235
Sandstone, dark—10″ casing 265′ 3½″	54	289
Shale, light—gas 309′	129	418
Sandstone, light—show oil 435′	85	503
Shale, dark—gas 418′ to 436′	6	509
Sandstone—big water 454′	59	568
MISSISSIPPIAN SYSTEM		
Limestone (Big Lime) 8¼″ casing 447′ 4″	92	660
Shale, dark—bottom hole packer	15	675
Sandstone (Big Injun)—6⅝″, 611′ bottom	128	803
Shale, light—hole packer	447	1250
Shale (coffee)—"Sunbury"—gas 654′	11	1261
Sandstone—"Berea"	25	1286
Shale—gas 1329′ 6″, show oil 1262′	8	1294
Sandstone—"Bedford"	54	1348
Shale, shells	27	1375
DEVONIAN SYSTEM		
Shale, brown—water in the engine 705, 20, 41	90	1465
Shale, light	12	1477
Shale, brown	23	1500
Shale, light—gas 1400′ in shale	50	1550
Shale, brown—gas 1742′, Gordon No. 1	250	1800
Shale, light—gas 1808′, Gordon No. 2	10	1810
Shale, brown—gas 1818′	55	1865
Shale, light—Ohio	15	1880
Shale, brown	68	1948
Shale, light	128	2076
Limestone—"Corniferous"	109	2185
Total depth		2185

Shot 60 quarts in Gordon No. 2 from 1806 to 1821 ft. Gas at 1329½ ft. Berea. Show of oil at 1262′. Good show of oil and gas at 2152′ in the Corniferous. Plugged Corniferous in Armco No. 5 at 2087 and 2079 with two 3′ seasoned plugs.

WELL No. 34.

Ben F. Lucas, No. 1, lessor. Summit Oil & Gas Co., lessee. Location: ½ mi. north of Summit Station on Hoods Creek, in Boyd County, Ky. Completed: Sept. 20, 1924. Production: Natural gas 150,000 cu. ft. and after shot, bailed. 36 bbls. of oil in 36 hours. Authority: W. R. Forman, driller. C. H. E. 602.1′ A. T.

Strata	Thickness	Depth
RECENT		
Surface	6	6
PENNSYLVANIAN SYSTEM		
Shale, blue	10	16
Sandstone	20	36
Shale	69	105
Sandstone	15	120
Coal	2	122
Shale	20	142
Sandstone	20	162
Shale	98	260
Sandstone—sham gas	25	285
Shale	20	305
Limestone	5	310
Shale	25	335
Sandstone (conglomerate)	15	350
Shale	50	400
Salt, sand—water 415′	49	449
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	66	515
Shale, dark	5	520
Shale, sandy	5	525
Shale	5	530
Limestone, white	5	535
Sandstone—"Big Injun"	135	670
Shale	80	750
Shale—"Waverly"	337	1087
Shale—"Sunbury"	20	1107
Sandstone—"Berea"—(good gas 1170-1190)	95	1202
DEVONIAN SYSTEM		
Shale	34	1236
Shale	24	1260
Shale, white	140	1400
Shale, brown	70	1470
Shale, white	447	1917
Limestone (Corniferous sand), oil pay 1994-2007	85	2002
Total depth		2007

685 ft. of 6⅝″ casing used. 200 ft. of 8″ casing used. Devonian shale gas 1470′-1474′. Corniferous shot 2007′ with 40 quarts glyc.

WELL No. 35.

George W. Fraley, No. 1, lessor. Summit Oil & Gas Co., lessee. Location: East side of Hoods Creek, 3,000 feet north of Summit Sta-

tion, Boyd County, Ky. Drilled: Feb., 1925. Driller: W. R. Forman. C. H. E. 606.7′. A. T. Production: 300,000 cu. ft. natural gas.

Strata	Thickness	Depth
RECENT		
Soil	17	17
PENNSYLVANIAN SYSTEM		
Shale, blue	19	36
Sandstone	24	60
Shale	45	105
Sandstone	15	120
Coal	2	122
Shale	20	142
Sandstone	20	162
Shale	98	260
Sandstone—"1st Salt Sand"—(gas)	25	285
Shale	20	305
Limestone	5	310
Shale	25	335
Sandstone	15	350
Shale	70	420
Sandstone—"2nd Salt Sand"—(water)	49	469
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	66	535
Shale, dark	5	540
Shale, red, sandy	5	545
Shale	5	550
Sandstone "Big Injun"	135	685
Shale	80	765
Shale—"Waverly"	337	1102
Shale—"Sunbury"	14	1116
Sandstone—"Berea"	91	1207
DEVONIAN SYSTEM		
Shale	29	1236
Shale	24	1260
Shale, white	140	1400
Shale, brown—"Ashland"—(gas 1540′-1546′)	146	1546
Shale, white	374	1920
Limestone (Corniferous sand)	89	2009
Total depth		2009

Well shot Feb. 21, 1925. 700 ft. of 6⅝″ casing. 185 ft. 8″ casing. Small gas in salt sand. Gas in Berea, 12 ft. of "pay." Gas in brown Devonian shale. Oil, 1127′ to 1135′. Gas, 1192′ to 1202′. Oil show 1997′ to 2009′.

WELL No. 36.

Ike Fannin, No. 1, lessor. Kent Millis, et al., lessees. Location: Ike Fannin farm, on east side of Bear Creek back of Isaac Fannin house, one mile south of Poverty Gap road at Culbertson P. O., Ky. Kent Bolt, drilling contractor. Drilled in spring of 1920. Was not shot, would probably produce ½ bbl. had it been shot. Elevation top of casing 620.71′ A. T. Elevation surface of ground, 619.88. 1345 ft. 6⅝″ casing. Casing is removed, well plugged. 10″ pipe remains. Authority: Kent Bolt, contractor.

Strata	Thickness	Depth
RECENT		
Surface clay	19	19
PENNSYLVANIAN SYSTEM		
Shale, red	26	45
Sandstone (water)	20	65
Shale, black	240	305
Sandstone (water)	25	330
Shale	120	450
Sandstone, show of oil	20	470
Shale, shell	330	800
Sandstone (salt sand)	70	870
Shale, black	120	900
Sandstone, settling, white	100	1000
Shale, black	20	1020
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	90	1110
Shale	35	1145
Sandstone, white—"Big Injun"	20	1165
Shale	565	1730
Shale, brown—"Sunbury"	17	1747
Sandstone and shale	32	1779
Sandstone—"Berea"—show of oil	12	1791
Sandstone, shale	56	1847
Total depth		1847

WELL LOG No. 37.

J. H. Elam, No. 1, lessor. Petroleum Exploration Co., lessee. Location: On Cane Creek in Greenup County, Ky., about ⅜ mile north of the Carter County line and 1⅝ miles west of the Boyd County line. The well is reported to have produced some oil but was abandoned. No log appears to be available. Contractor: W. R. Formon, Ashland, Ky. C. H. E. 611.8′ A. T.

WELL No. 38.

GREENUP COUNTY

A. Elam, No. 1, lessor. Petroleum Exploration Co., lessee. Location: Near Hunnwell P. O. on Cane Creek near county line. Commenced: July 24, 1922. Completed: Sept. 19, 1922. Contractor: C. P. Gordon & Sons. Drillers: Dougherty & Gordon. Well shot: Sept. 12th with 40 qts. from 1012 to 1049. 2-4½ shells used. C. H. E. 628.8′ A. T. Production: Well tested out for 5 days after shot and tested 1 bbl. of oil.

Strata	Thickness	Depth
RECENT		
Soil	30	30
PENNSYLVANIAN SYSTEM		
Sandstone (soft)	30	60
Shale, blue	40	100
Shale	10	110
Sandstone, shaley	160	270
Shale, blue, soft	6	276
MISSISSIPPIAN SYSTEM		
Limestone, hard—"Big Lime"	49	325
Limestone, soft—"Big Lime"	50	375
Shale	15	390
Shale, hard	30	420
Limestone—"Big Injun"	298	718
Shale, dark	15	733
Sandstone—salt water—well was pulled out and plugged	20	753
Shale, dark	30	783
Shale, light	150	933
Shale, brown—"Sunbury"	16½	949½
Sandstone—"Berea"	94	1043½
Sandstone—"Berea"—oil 1012½-1027½	94	1043½
Shale	6	1049½
Total depth		1049½

Casing record—Size 10 Feet 20 Left hole could not pull
Casing record—Size 8¼ Feet 54 Left hole could not pull
Casing record—Size 6⅝ Feet 490 Pulled out.
Shot Sept. 12th, 1922, 2-4½-20. 40 qts. Anchor 24.

BOYD COUNTY

LOG No. 39.

K. Towler, No. 1, lessor. Lessee unknown. Location: About 1,000 feet below mouth of Cobb Fork of Williams Creek, 1½ miles northwest of Princess, Boyd County, Ky. No log available. Well reported to have been about 650 feet deep. Drilled about 25 or 30 years ago. Produced

considerable gas, now flowing salt water. C. H. E. 589.6′ A. T. Abandoned.

WELL No. 40.

Jack Arthur No. 1, lessor. Silver Run Oil Co., lessee. Location: 1½ miles up right fork of White's Creek nearly 2 miles due west of Savage P. O., Boyd Co., Ky. Production: Dry. C. H. E. 634.4′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	6	6
Gravel	22	28
PENNSYLVANIAN SYSTEM		
Shale, blue	37	65
Sandstone, white	15	80
Shale, black	30	110
Sandstone, dark	5	115
Shale, black	175	290
Sandstone	10	300
Shale (Red Rock)	15	315
Shale, white	30	345
Sandstone—"Cow Run"	40	385
Shale, dark	20	405
Second "Cow Run"	50	455
Shale, white	205	660
Sandstone, white	40	700
Shale, black	65	765
Sandstone—"Salt"	70	835
Shale, black	25	860
Sandstone, white	45	905
Shale, black	25	930
Sandstone, white	5	935
Shale, blue	4	939
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	40	979
Shale, blue	3	982
Limestone, white	37	1019
Limestone, sandy	16	1035
Shale, red and blue	25	1060
Sandstone—"Big Injun"	175	1235
Shale	424	1659
Shale, brown (Sunbury)	20	1679
Sandstone —"Berea"—water	42	1721
Shale	12	1733
Total depth		1733

WELL No. 42.

Lacy Howard, No. 1, lessor. The American Rolling Mill Co., Ashland, Ky., No. 17 (W-8), lessee. Location: 1 mile south of Summit Station, and six miles from Ashland, Ky., 200 feet west of the Midland Trail, Boyd County, Kentucky. C. H. E. 695.30′ A. T. Commenced: April 14, 1925. Completed: May 7, 1925. John G. White, Ashland, Ky., contractor. Production: Dry, plugged and abandoned.

Strata	Thickness	Depth
RECENT		
Soil—conductor 13′	22	22
PENNSYLVANIAN SYSTEM		
Shale, dark	84	106
Sandstone	24	130
Shale, dark	5	135
Sandstone	15	150
Shale	76	226
Limestone	10	236
Shale, dark (gas 240)	3	239
Sandstone	51	290
Shale, dark	10	300
Sandstone	5	305
Shale, dark	30	335
Coal	2	337
Shale, dark	59	395
Shale, dark	23	418
Shale, light	32	450
Shale, dark	20	470
Fire clay	5	475
Sandstone	10	485
Shale, sandy	10	495
Shale, dark	19	514
Shale, sandy	13	527
Sandstone (gas 532)	69	596
Limestone—"Big Lime"	18	614
Shale	1	615
Limestone—"Big Lime"	31	646
Limestone, sandy	9	655
Shale, dark	25	680
Sandstone—"Big Injun"—(water 745)	140	820
Shale, sandy	433	1253
Shale—"Sunbury"	18	1271
Sandstone—"Berea"—oil 1291′, gas 1339′ to 1353′	90	1361
Shale, dark	39	1400
DEVONIAN SYSTEM		
Shale, black	78	1478
Shale, light	27	1505

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, black	13	1518
Fire clay	12	1530
Shale, light	36	1565
Shale, brown	215	1780
Shale, gray	20	1800
Shale, brown	135	1935
Shale, light	143	2078
Limestone—"Corniferous"	18–4″	2096–4″
Total depth		2096–4″

WELL No. 58.

Lewis Skaggs, No. 1, lessor. Summit Oil & Gas Co., lessee. Location: On head waters of Daniels Fork, Boyd County, Ky. Commenced: 1925. Completed: April 10, 1925. Production: 50,000 cu. ft. of gas in Berea, Corniferous, dry. Driller: W. R. Forman. C. H. E. 709.0′ A. T. Authority: S. D. Wheeler.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale and coal	518	518
MISSISSIPPIAN AND DEVONIAN SYSTEMS		
Limestone—"Big Lime"	52	570
Sandstone—"Big Injun" and Waverly shale	548	1118
Shale—"Sunbury"	15	1133
Sandstone—"Berea" and Devonian shale	777	1910
Limestone (Corniferous sand)	140	2050
Total depth		2050

Notes:—Shot 2nd pay in Berea, and shot top pay, Friday, April 10th. Partial record only.

WELL No. 63-A.

The American Rolling Mill Company, Ashland, Ky., No. 15 (W-6), lessor and lessee. Location: Six miles from Ashland, Kentucky, east of the Midland Trail, and 1,000 feet northeast of Mason No. 33 well, in Boyd Co., Ky. Casing head elevation 695.20. Commenced: March 28, 1925. Completed: May 4, 1925. John G. White, Ashland, Ky., contractor. Production: Good gas well but was lost in setting casing on top of Big Lime. Plugged and abandoned.

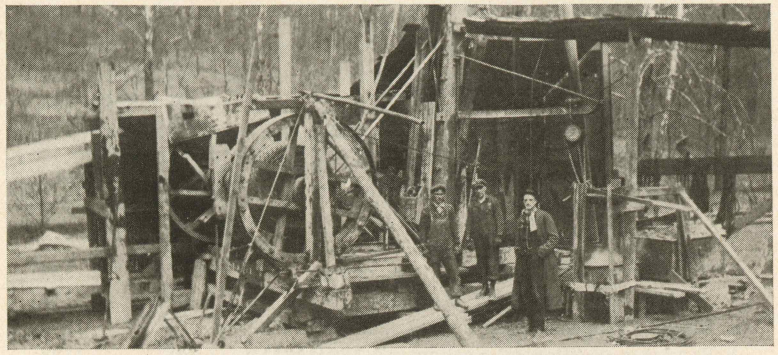
Strata	Thickness	Depth
RECENT		
Soil and gravel	13	13

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, light	7	20
Shale, sandy	20	40
Shale, dark	30	70
Shale, sandy	60	130
Shale, light (gas 135)	40	170
Sandstone, hard	30	200
Coal (water)	2	202
Shale, dark	18	220
Fire clay	5	225
Shale, dark	25	250
Shale, light	7	257
Shale, dark	8	265
Shale, light	35	300
Shale, sandy	30	330
Shale, light	40	370
Shale, sandy	20	390
Shale, light	20	410
Shale, dark	30	440
Sandstone—gas 445	27	467
Shale, dark	5	472
Sandstone, white	39	511
Shale, dark—water 552′	39	550
Sandstone (three-fourths million)	92	642
Shale—gas 555′	12	654
MISSISSIPPIAN SYSTEM		
Limestone, "Big Lime" (inexhaustible water at 565)	31	684
Shale, light	24	708
Limestone—"Big Injun"	60	768
Total depth		768

WELL LOG No. 63-B.

The American Rolling Mill Company, Ashland, Ky., No. 15 (W-9), lessor and lessee. Location: Six miles southeast of Ashland, Ky., within 20 ft. of well 63-A. Casing head elevation 695.0′ A. T. Commenced: May 4, 1925. Completed: 1925. John G. White, Ashland, Ky., contractor. Production: Natural gas; Corniferous plugged at 2102′.

Strata	Thickness	Depth
RECENT		
Soil and gravel	13	13
PENNSYLVANIAN SYSTEM		
Shale, light	2	15
Sandstone	10	25



AMERICAN ROLLING MILL CO., NO. 15

This well was drilled by J. G. White in April, 1925. It is located on Mason Branch near Summit Station.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, dark	18	43
Shale, light	11	54
Shale, dark	18	72
Coal	2	74
Shale, dark	6	80
Shale, light	25	105
Coal	1	106
Shale, light	9	115
Sandstone	45	160
Shale	23	183
Coal	1	184
Shale, light	6	190
Coal	2	192
Fire clay	22	214
Shale, dark	5	219
Shale, light	5	224
Shale, dark (10″ casing 2271′–2″)	36	260
Sandstone, light	35	295
Shale, dark	12	307
Shale, sandy	12	319
Shale, dark	11	330
Shale, light	35	365
Shale, sandy	45	410
Shale, dark (gas 417)	7	417
Coal	1	418
Shale, dark	22	440
Sandstone (gas 445, water 450)	27	467
Shale (water 472′)	5	472

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone (little water 484′)	40	512
Shale, dark	36	548
Sandstone (big water 552′ and gas)	98	646
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"—(8¼ casing 656′)	33	679
Sandstone	14	693
Shale	13	706
Sandstone—"Big Injun"—(6⅝ casing 839′)	133	839
Shale	441	1280
Shale—"Sunbury"	10	1290
Sandstone—"Berea"—(show oil 1304′-1311′)	38	1328
Shale (gas 1325′)	12	1340
Sandstone (gas 1354′-1370′)	30	1370
Shale	52	1422
DEVONIAN SYSTEM		
Shale, black	83	1505
Shale, light	82	1587
Shale, dark	236	1823
Shale, light	15	1838
Shale, black	34	1872
Shale, light	36	1908
Shale, brown	62	1970
Shale, light (plugged, Cornif. 2102)	132–4″	2102–4″
Limestone—"Corniferous" (oil 2127-77)	102–8″	2205
Total depth		2205

WELL LOG No. 64.

Nando Felty, No. 1, lessor. The American Rolling Mill Company, Ashland, Ky., No. 16 (W-7), lessee. Location: Six miles from Ashland, Ky., on the Midland Trail, and one mile south of Summit Station in Boyd County, Ky. Casing head elevation 691.2′ A. T. Commenced: April 6, 1925. Completed: 1925. John G. White, Ashland, Ky., contractor. Production: Small gas and oil, well plugged and abandoned.

Strata	Thickness	Depth
RECENT		
Soil (conductor)	8	8
PENNSYLVANIAN SYSTEM		
Shale, blue ("mud")	13	21
Sandstone	14	35
Shale, dark	35	70
Coal	3	73
Shale, dark	19	92
Sandstone	83	175

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, dark	87	262
Sandstone	13	275
Shale, light	5	280
Sandstone	20	300
Shale, dark	28	328
Coal	3	331
Shale, dark (gas 430-440)	99	430
Sandstone	50	480
Shale, light	28	508
Sandstone	3	511
Shale, dark	8	519
Sandstone	68	587
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	19	606
Limestone, sandy—"Big Lime"	32	638
Sandstone—"Big Injun"—gas 640′	12	650
Limestone	8	658
Shale, light	29	687
Limestone	8	695
Sandstone (water 761, 1 bbl. hr.)	119	814
Shale, gray	236	1050
Limestone, black, shells	18	1068
Shale, gray	177	1245
Limestone, shells	6	1251
Shale—"Sunbury"	12	1263
Sandstone—"Berea"—(show oil 1263)	15	1278
Shale	1	1279
Sandstone, brown	11	1290
Shale	19	1309
Sandstone—"Berea"	13	1322
Shale	6	1328
Sandstone—"Berea"—good show oil 1345	38	1366
Shale, blue	44	1400
DEVONIAN SYSTEM		
Shale, black	125	1525
Shale, light	50	1575
Shale, brown	370	1945
Shale, light	129	2074
Limestone—"Corniferous"	89–2″	2163–2″
Total depth		2163–2″

WELL No. 78.

American Rolling Mill Co., Ashland, Ky., No. 18 (W-10), lessor and lessee. Location: Four miles southwest of Ashland, Ky., Boyd County. Casing head elevation 693.21′ A. T. Commenced: May 20,

CABIN BRANCH GASSER

This well, when flush, produced large amounts of gas from the Salt Sand at shallow depths. Its productive record surpasses that of any other shallow gasser drilled in Boyd County.

1925. Completed: May 28, 1925. John G. White, Ashland, Ky., contractor. Production: Fine gas well when flush.

Strata	Thickness	Depth
RECENT		
Soil	9	9
PENNSYLVANIAN SYSTEM		
Shale	31	40
Coal	2	42
Shale, muddy	3	45
Shale, sandy (big water at 50′)	40	85
Shale, muddy	58	143
Sandstone	25	168
Shale, muddy	7	175
Sandstone	17	192
Shale, muddy (10″ casing 232′)	40	232
Sandstone	16	248
Shale, dark (gas in shale 263′)	22	270
Sandstone	35	305
Shale	40	345
Shale, black (gas in shale at 350′)	35	380
Sandstone, gray	18	398
Shale, black	30	428
Shale	32	460
Sandstone, dark, "salt"	10	470
Shale, light (water, 6 bbls. per hr., 495)	25	495
Sandstone (gas at 522-528′)	33½	528½
Total depth		528½

Note:—Top gas sand 495′, but no gas to 522′; tubed and closed into line.

WELL LOG No. 79.

The American Rolling Mill Company, Ashland, Ky., No. 19 (W-11), lessor and lessee. Location: Two miles south of Ashland, Ky., on the Midland Trail, Boyd County, Ky. Casing head elevation 642.52′ A. T. Commenced: June 1, 1925. Completed: July 4, 1925. John G. White, Ashland, Ky., contractor. Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil	16	16
PENNSYLVANIAN SYSTEM		
Shale (big water at 21′)	8	24
Sandstone (gas at 50′)	28	52
Shale, dark	48	100
Sandstone	30	130
Shale, light	10	140
Shale, muddy	50	190
Shale, sandy	10	200
Shale, dark	35	235
Sandstone	45	280
Shale, dark	60	340
Shale, gray	18	358
Shale, dark	42	400
Shale, sandy (water at 420′)	65	465
Shale, dark (water 450′)	8	473
Sandstone (No. 10 gas sand)	3	476
Shale, sandy	27½	503½
Sandstone (No. 10 gas sand)	3	506½
Sandstone (water 507 and gas)	23½	530
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	31	561
Shale, sandy	2	563
Limestone, gray	38	601
Sandstone—"Big Injun"	20	621
Shale	8	629
Sandstone (second "Big Injun")	39	768
Shale, dark (water 683)	442	1210
Shale—"Sunbury"	21	1231
Sandstone—"Berea"—(show oil 1241)	11	1242
Shale, muddy	42	1284
Sandstone—"Bedford"—(gas 1291)	29	1313
Shale, sandy	62	1375
DEVONIAN SYSTEM		
Shale, black	72	1447
Shale, light	98	1545
Shale, brown (gas 1749)	204	1749
Shale, white	2	1751

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, brown	20	1771
Shale, light	15	1786
Shale, brown (gas 1911′)	140	1926
Shale, light	132	2058
Limestone—"Corniferous"	25	2083
Limestone—"Corniferous"—(gas 2142′–8″)	84–8″	2167′–8″
Total depth (show oil 2155)		2167′–8″

Conductor 13″, 16′. Casing 10″ 213′; 8″ 545,; 8″ 768′.

WELL LOG No. 80.

American Rolling Mill Company, Ashland, Ky., No. 20 (W-12), lessor and lessee. Location: Three miles southwest of Ashland, ½ mile southeast of the Midland Trail, on head of Keys Creek, Boyd County, Ky. Casing head elevation 701 ft. A. T. Commenced: July 1, 1925. Completed: Aug. 8, 1925. John G. White, Ashland, Ky., contractor. Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil	12	12
PENNSYLVANIAN SYSTEM		
Sandstone	4	16
Shale, blue	24	40
Coal	2	42
Sandstone (water at 85)	43	85
Shale	5	90
Sandstone	30	120
Shale, sandy	7	120
Sandstone, gray	15	142
Shale	18	160
Shale, sandy (water at 175)	15	175
Sandstone	42	217
Sandstone, gray sandy	11	228
Shale, muddy	19	247
Shale, sandy	7	254
Shale, muddy (gas at 276)	22	276
Shale, sandy	15	291
Sandstone	37	328
Shale, dark	9	337
Sandstone, gray (gas at 338)	28	365
Shale	26	391
Shale, light	33	424
Shale, dark	50	474
Sandstone	10	484

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone (water)	6	490
Sandstone	28	518
Sandstone (water)	6	524
Sandstone	14	538
Shale, black	1	539
Sandstone	6	545
Shale (gas at 571)	25	570
Sandstone (water at 573)	71	641
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	21	662
Shale, limy	1	663
Limestone—"Big Lime"	41	704
Sandstone	4	708
Limestone, sandy	22	730
Shale, green	4	734
Sandstone—"Big Injun"	48	782
Pebbles	5	787
Sandstone—"Big Injun"	8	795
Shale	5	800
Shale, sandy	220	1020
Shale, dark	23	1043
Shale	44	1087
Shale, light gray	5	1302
Shale—"Sunbury"	20	1322
Sandstone—"Berea"—(gas at 1322)	11	1333
Sandstone (broken shaly)	36	1369
Sandstone, brown—gas at 1369	39	1408
Shale, sandy	14	1422
DEVONIAN SYSTEM		
Shale, light	21	1443
Shale, brown	97	1540
Shale, light	110	1650
Shale, brown (gas at 1850)	187	1837
Gas "sand"—"Gordon No. 1"	32	1869
Shale, light	18	1887
Gas "sand"—"Gordon No. 2" (gas at 1893)	40	1927
Total depth		1927′–3″

WELL LOG No. 81.

The American Rolling Mill Company, Ashland, Ky., No. 21 (W-13), lessor and lessee. Location: Four miles southwest of Ashland, Ky., on the head of Mason Branch and east of the Midland Trail, Boyd County, Ky. Casing head elevation 742.78′ A. T. Commenced: June 18, 1925.

Completed: July 21, 1925. John G. White, contractor, Ashland, Ky. Production: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil and gravel	12	12
PENNSYLVANIAN SYSTEM		
Sandstone	6	18
Fire clay	82	100
Sandstone	8	108
Fire clay	14	122
Coal	1	123
Shale, dark	6	129
Shale, light	79	208
Sandstone (water)	34	242
Shale	6	248
Coal	1	249
Shale (water at 262)	79	328
Sandstone	29	357
Shale	13	370
Sandstone	14	384
Shale, light (gas 430)	46	430
Sandstone	10	440
Shale, sandy	19	459
Shale (little water at 485)	26	485
Shale, sandy	16	501
Limestone, shells	7	508
Sandstone	12	520
Shale	5	525
Sandstone	23	548
Shale	2	550
Sandstone (like No. 10 at 550′)	5	555
Shale (water at 563′)	12	567
Sandstone, dark, broken (gas and water at 597–2½″)	30	597
Sandstone, white	67–1½″	664–4″
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	65–8″	730
Shale	30	760
Sandstone—"Big Injun"—(water at 815′)	20	780
Shale	27	907
Sandstone	26	933
Shale, sandy	387	1320
Shale—"Sunbury"	19½	1339½
Sandstone—"Berea"	28	1367½
Shale, break	21½	1389
Sandstone—"Bedford" (gas 1390′ in Berea)	47	1436

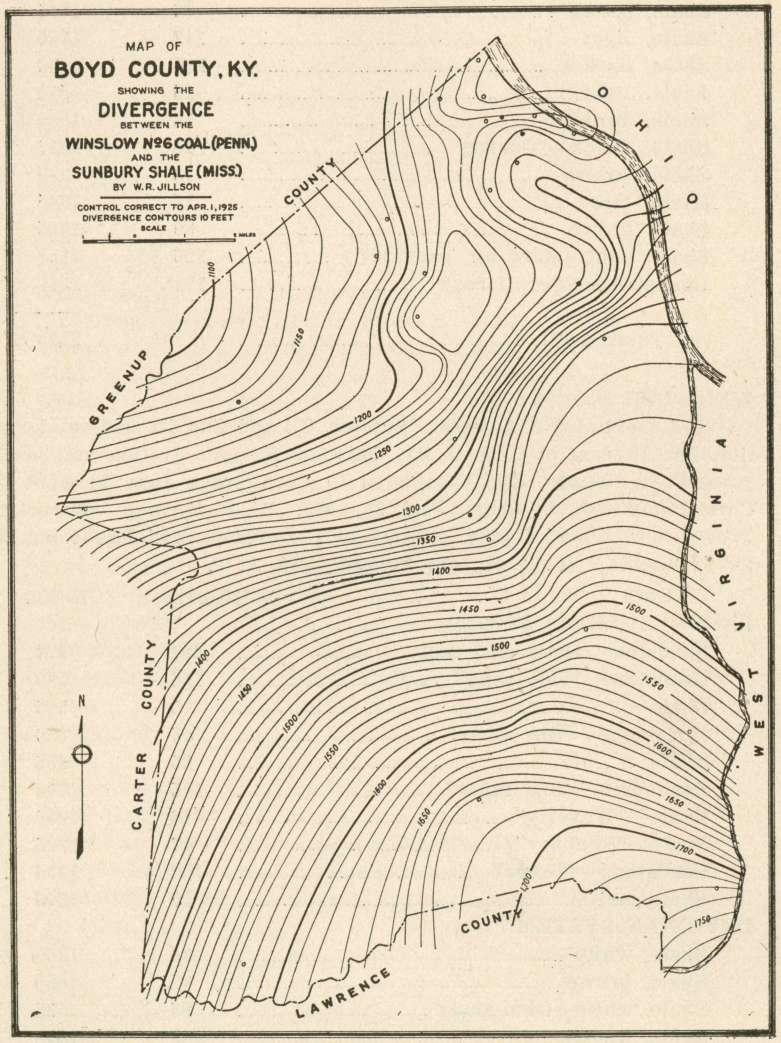
Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, light (gas at 1406)	29	1465
Shale, brown	76	1541
Shale, light	112	1653
Shale, dark	213	1866
Shale, light	15	1881
Shale, brown	18½	1899½
Shale, black—"Gordon"	18	1917
Shale, brown	13	1930
Shale, light	15	1945
Shale, brown	80	2025
Shale, light (show oil, gas 2237′)	126–8″	2151–8″
Limestone—"Corniferous"	108	2259–8″
Total depth		2259–8″

WELL LOG No. 102.

S. J. DeBord, No. 1, lessor. Summit Oil and Gas Co., lessee. Location: 500 ft. east of C. & O. Ry., between Summit Station and brick yard, Boyd County, Ky. Completed to Corniferous June 24, shot to Corniferous with 100 quarts June 25, 1925. W. R. Forman, contractor. Production: About 2 bbls. natural in Corniferous and 50,000 cu. ft. gas in "Berea." C. H. E. approximately 702. A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, shale and coal	464	464
Sandstone, "salt sand"	116	580
Shale	5	585
Limestone—"Big Lime"	45	630
Shale	25	655
Sandstone—"Big Injun"	135	790
Shale—"Waverly"	418	1208
Shale—"Sunbury"	17	1225
Sandstone—"Berea"	109	1334
Shale, red	15	1349
DEVONIAN SYSTEM		
Shale, white	16	1365
Shale, brown	85	1450
Shale, white—Ohio shale	85	1535
Shale, brown	363	1898
Shale, white	133½	2031½
Limestone—"Corniferous"	95½	2127
Total depth		2127

Note:—Oil show 1241-1251; gas and oil show 1280-1287; oil 2111-2127; set 6⅝ casing at 790 ft.



Thickening of Carboniferous Sediments in Boyd County.

WELL No. 111.

The American Rolling Mill Company, Ashland, Ky., No. 22 (W-14), lessor and lessee. Location: Three miles west of Ashland in 2nd horseshoe bend of Midland Trail, Boyd County, Ky. Casing head elevation 710.0 A. T. Commenced: July 24, 1925. Completed: Aug. 28, 1925. John G. White, contractor, Ashland, Ky. Producton: Natural gas.

Strata	Thickness	Depth
RECENT		
Soil	8	8
PENNSYLVANIAN SYSTEM		
Shale, light	47	55
Sandstone	12	97
Sandstone, gray	19	116
Shale, light	26	142
Coal (water)	1	143
Shale, dark	23	166
Sandstone (water)	40	206
Shale, light	8	214
Coal	1	215
Shale, dark	20	235
Shale, light	13	248
Sandstone	11	259
Shale, dark	18	277
Shale, sandy	14	291
Sandstone	38	329
Shale, muddy	1	330
Sandstone, gray	28	358
Shale, dark	12	370
Shale, light	23	393
Shale, dark	55	448
Shale, light	27	475
Sandstone, dark blue	11	486
Sandstone, dark gray	17	503
Shale, light	3	506
Sandstone, gray (No. 10 sand 510-511)	5–1″	511–1″
Shale, black	39	550
Sandstone (water at 550)	80	630
MISSISSIPPIAN SYSTEM		
Limestone—"Big Lime"	58	688
Sandstone "Big Injun" (water at 700)	12	700
Shale, dark	16	716
Sandstone "Big Injun"	126	842
Shale, light	444	1286
Shale, black, coffee—"Sunbury"	18	1304
Sandstone—"Berea" (gas 1308, oil 1315)	14	1318

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Sandstone, broken—"Berea"	34	1352
Sandstone—"Berea" (gas Berea 1361)	48	1400
DEVONIAN SYSTEM		
Shale, light	43	1443
Shale, black, coffee	78	1521
Shale, light	84	1605
Shale, brown	233	1838
Shale, light	12	1850
Shale, brown	12	1862
Shale, black (Gordon No. 1) (gas 1877, Gordon No. 1)	23	1885
Shale, black broken (gas 1926, Gordon No. 2)	35	1920
Shale, black	60	1980
Shale, light	136½	2116½
Limestone—"Corniferous" (oil, gas show 2132-2189)	92½	2209
Total depth		2209

WELL LOG No. 112.

CARTER COUNTY

J. W. Johnson, No. 1, lessor. John G. White, No. 1, lessee. Location: 6½ miles east of Grayson, on head of Wilson Creek, near Upper Wilson School, Carter County, Ky., on Midland Trail. Commenced: Sept. 5, 1925. Completed: Oct. 3, 1925. Production: Small gas; plugged and abandoned after shooting 781-1787 and 1798-1804 with 40 quarts. C. H. E. 671.0′ A. T.

Strata	Thickness	Depth
RECENT		
Soil	11	11
PENNSYLVANIAN SYSTEM		
Sandstone	2	13
Fire clay	13	26
Sandstone (water at 32)	6	32
Shale, light	4	36
Sandstone (water at 45)	9	45
Shale, light	12	57
Fire clay	3	60
Coal	1	61
Fire clay	5	66
Shale	16	82
Sandstone (10″ casing, 117 water)	33	115
Shale, dark	13	128
Sandstone, gray (gas 133)	7	135

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, muddy	30	165
Shale, light	10	175
Sandstone (oil 180)	6	181
Shale, light	14	195
Shale, dark	12	207
Sandstone, gray (gas 208)	13	220
Shale, dark (salt water 290)	31	251
Sandstone—"salt" (gas 263-268)	199	450
MISSISSIPPIAN SYSTEM		
Sandstone—"Big Injun" (462′-8½ gas)	45	495
Shale, sandy	73	568
Sandstone—"Big Injun" (oil 574)	70	638
Sandstone (oil 643, water 663)	57	795
Shale, sandy, dark	35	830
Shale, light	115	945
Shale, dark	94	1039
Shale—"Sunbury"	7	1046
Sandstone—"Berea" (oil 1115)	89	1135
Shale, dark (shot 60 quarts)	11	1146
Sandstone, dark (1115-24)	15	1160
DEVONIAN SYSTEM		
Shale, light	26	1186
Shale, brown	74	1260
Shale, light (Gordon No. 1)	62	1322
Shale, black (Gordon No. 1) (gas 1322)	280	1502
Shale, light (shot 60 qts. 1325-1334)	23	1525
Shale, brown	48	1573
Shale, light	18	1591
Shale, black (Gordon No. 2)	54	1645
Shale, light (gas 1591)	104	1749
Limestone—"Corniferous" (gas 1783, oil 1798)	75	1824
Total depth		1824

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Manuscript written May, 1925.
Revised July, 1926.

VI.

MORTON'S GAP OIL POOL.

In September, 1922, announcement was made of the discovery of oil in commercial quantity in a well on the C. S. Williams farm in Southeastern Hopkins County. The strike was made by the Copper Flash Oil Co. of Linton, Indiana, while drilling a wild-cat test. The success which attended this isolated prospect drilling in a region that had generally been regarded as somewhat unfavorable because of a rather considerable amount of faulting has stimulated much inquiry as to the oil and gas possibilities of this and adjacent regions. Subsequent successful drilling has drawn additional attention to this productive district. Geological conditions present in this field have many parallels in the Western Kentucky coal field thereby rendering a description of this region as general as well as specific value to oil and gas operators.

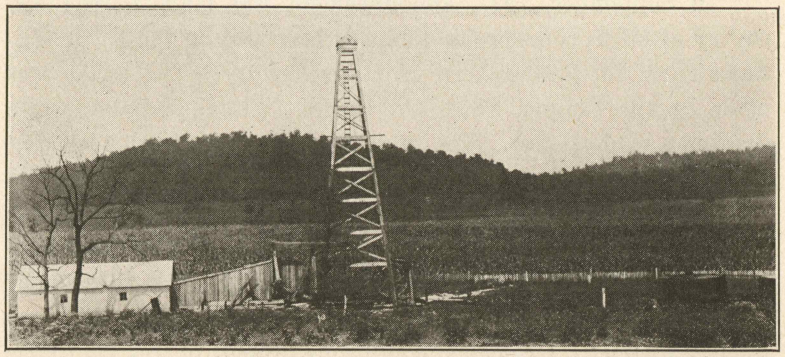
The Morton's Gap Oil Pool, as this producing district has now become generally known, is located in the Western Kentucky coal field in Southeastern Hopkins County, 115 miles in an air line Southwest of Louisville. The pool is about 2½ miles southeast of Morton's Gap on the road to White Plains. It is also about two miles northeast of Nortonsville and about one and one-half miles east of the "Dixie Bee Highway" from Henderson to Hopkinsville, Kentucky. Madisonville, which is the county seat, is 8½ miles an air line northwest of this field. The nearest postoffice is Oak Hill, a small mining community one mile due west of the principal producing area. The field is conveniently served by the Illinois Central Railroad and the L. & N. Railroad. These lines intersect at Nortonsville.

Drainage and Topography.

Embraced well within the Western Coal Field, the region surrounding the Morton's Gap Oil Pool is one of the low rounded hills widely separated by broad flat alluvium filled valleys. The productive area centering about the C. S. Williams lease is situated near to the divide between the Green and Tradewater

Rivers on the head of a branch of Drakes Creek, a tributary of Pond River, which is only four miles distant to the East.

The general relief of this district is slight, being not more at a maximum generally than 100 feet. The flat bottoms of



OIL WELL ON D. WILLIAMS FARM
This well is 2½ miles from Morton's Gap and is 2,057 feet deep. It has been pumping about 8-10 bbls a day.

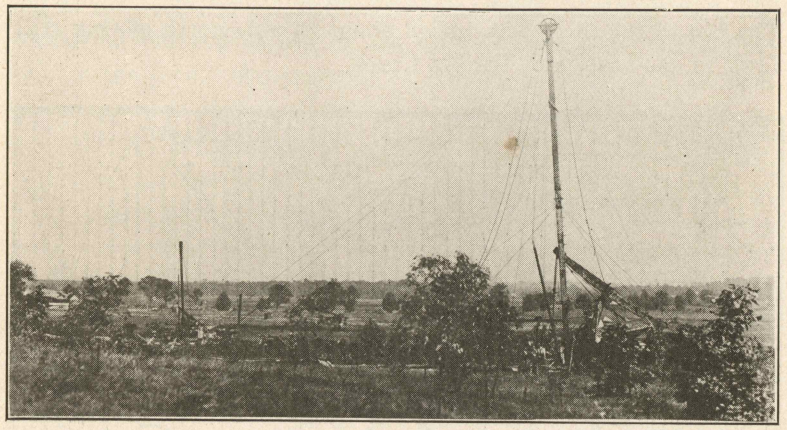
Drakes Creek range from ½ mile to 2 miles in width and 400 feet above sea level, while a very small part of the knoll east of Oak Hill catches the 500 foot contour. The maximum relief to the northwest in the vicinity of Madisonville on the head of Flat Creek increases slightly and is about 125 feet. To the south and southeast in the vicinity of Nortonville and White Plains the general relief decreases to 50 or 60 feet. The hills throughout this district are low and rounded, exhibiting a decided tendency to flare broadly out into the flat alluvium filled creek bottoms. The uplands exhibit as might be expected a fairly thick clay loam which rather effectually conceals outcrops of the bedded rocks.

Development.

The first well in the Morton's Gap pool, as has already been indicated, was drilled on the C. S. Williams lease by the Copper Flash Oil Co., of Linton, Indiana, in September, 1922, to a depth of 2,132 feet. Oil was secured at a depth of 2,057 feet, and the well was shot from 2,050-60 feet. This well pumped three to four barrels natural before shooting, and about seven to ten barrels afterwards. A reported Baume of 37.9 degrees has been

given for this oil, and a considerable amount of gas was produced from the well.

Since the drilling in of this first well, five additional wells have been drilled; three on the C. S. Williams farm and two on



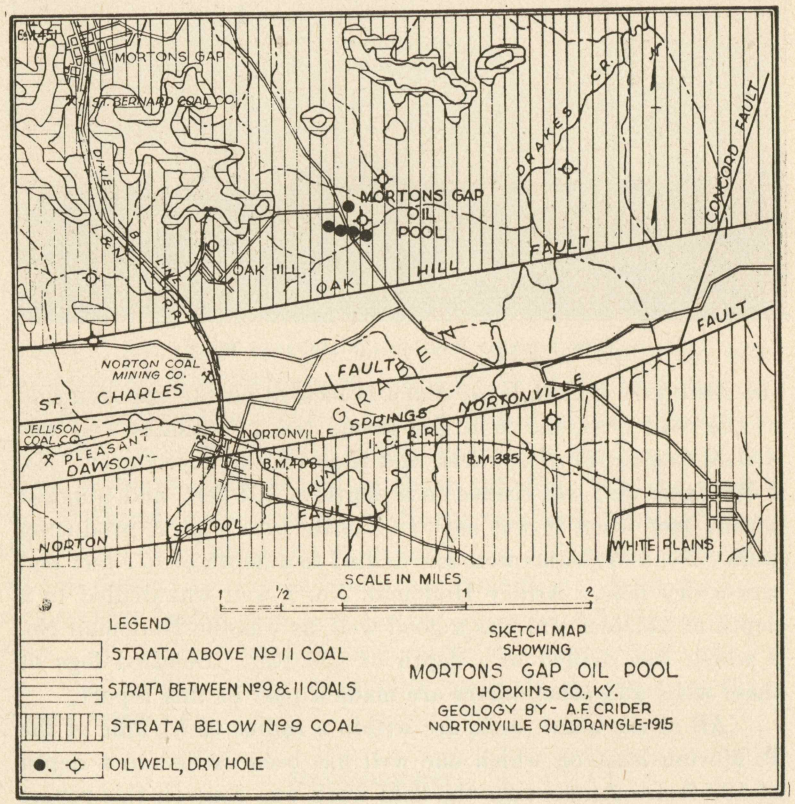
View Looking East on the Holeman Tract.

the Ashley Holloman lease which is located on the opposite side of the road from the Williams farm. No. 2 Williams well was drilled to a depth of 500 feet, and is an excellent producer. No. 3 Williams well was drilled to a depth of 701 feet, and plugged to 500 feet when it was shot and made into a good producing well. No. 4 Williams well was drilled to a depth of 577 feet and was a dry hole. Ashley Holloman No. 1 well was drilled to a depth of 511 feet and was a good well, as was the Holloman No. 2 which was drilled to a depth of 439 feet. Detailed logs of these wells and some others are made a part of this report.

All of the above wells are within a radius of ¼ mile of the P. Morton lease on which one well has been drilled to a depth of 500 feet. At the time the field work was done on this report the tools were in this hole, and it was reported to be dry.

Two wells have been drilled ¾ of a mile west of Oak Hill and two miles west of Morton's Gap oil pool. Both of these wells were dry. The southernmost of these wells was located on the Clement School fault, and probably never had any chance of production. A location has been found for a well at Oak Hill.

Three other wells have been drilled in the vicinity of Morton's Gap oil pool, all of which are dry. Two of these wells were drilled south of the Nortonville fault in the vicinity of White Plains. One of the wells on the lease of T. E. Dillingham was drilled by W. W. Kingston of Morton's Gap, Kentucky. The last of the three was drilled about ½ mile north of Oak Hill fault in the bottom of Drakes Creek.



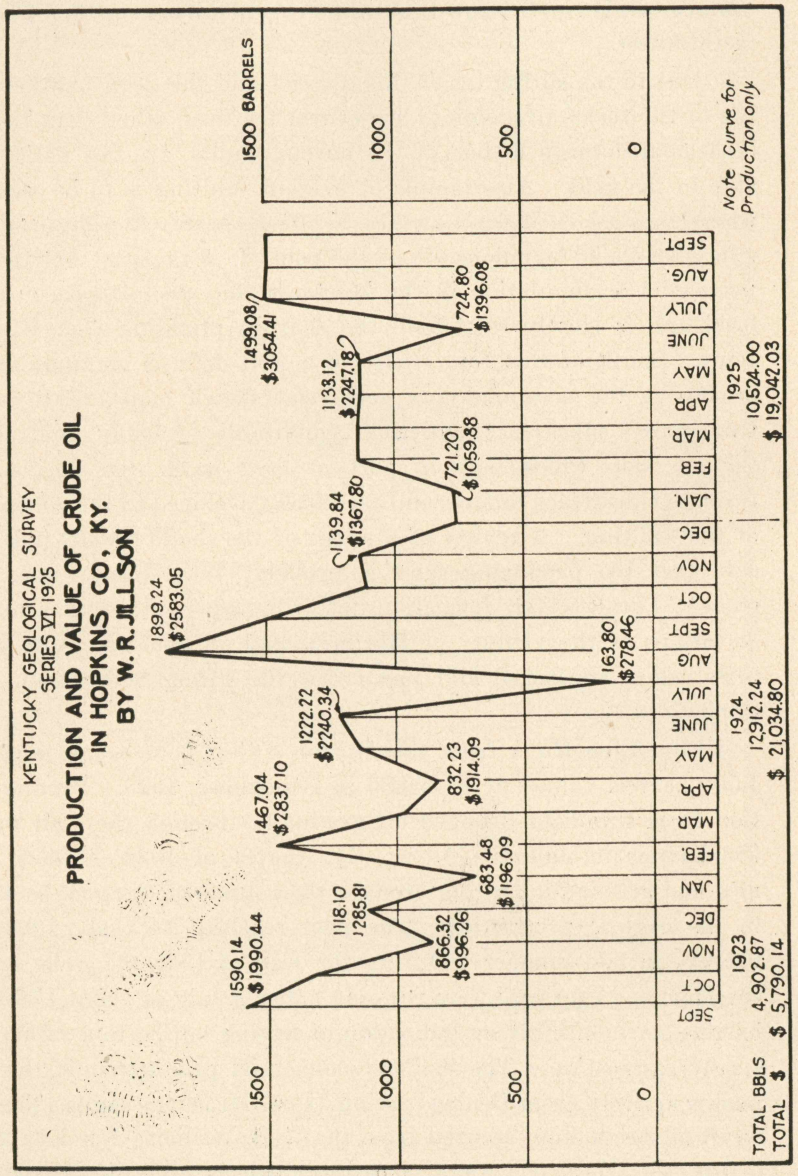
General Geology.

All of the rocks exposed in the vicinity of the Morton's Gap Pool are of Coal Measure age (Allegheny-Pennsylvanian). They consist of shales, sandstones, coals and limestones—named in the order of their importance in the section. The highest hills north and west of the pool show sediments deposited above the No. 11 coal while the lowest are those close below No. 9 coal.

No. 11 coal varies from 5½ to 7 feet in this part of Hopkins County, while No. 9 below it is thinner, generally about five feet in thickness.

Due to the silting up of this district and the deep weathering of the rocks, pronounced structural features, other than the occasional outcrop of one of the normal faults, are not noticeable in the field. An example of evident faulting is to be seen where the Oak Hill fault strikes N 80° E. across the Madisonville pike about ½ mile south of the pool. It is thought that the petroleum accumulation in the Morton's Gap pool is probably local and is closely related to the sharply plunging Oak Hill fault. South of this fault there is a well defined rectangular graben as the accompanying geological sketch map indicates. Unrevealed subsurface anticlinal conditions probably control the oil body which may in part at least have been derived through subsurface fissures and fractures developed in the course of the faulting. A review of the logs of the shallow wells indicate that the producing sand is probably the "Finnie sandstone" (Tradewater formation-Pottsville age). Casing head elevations in the vicinity of Morton's Gap oil pool are quite a little below No. 9 coal and just below the strong Sebree sandstone.

Pipe Line Runs from the Morton's Gap pool began with 1,500 barrels valued at $1,990.00 in September, 1923. Production from this field dropped off gradually through the Fall to 683 barrels in January, 1924. By August of 1924, however, new and successful drilling brought the volume of the pool back to its original production. The pool reached its peak, 1,899 barrels, in mid-summer. During the Fall of 1925 the wells in the Morton's Gap pool were running along evenly at about 1,500 barrels per month giving indication of having settled to a rather steady production. The shallow commercial production of this pool is entirely from Pennsylvanian (Coal Measure) sands. The small oil production secured from the C. S. Williams No. 1 at a depth of 2,057-59 feet was from a limestone, possibly of Chester (Mississippian) age. Oil runs from the Morton's Gap pool follow.



OIL RUNS—MORTONS GAP POOL

Central Producing & Refining Co.

1923	Bbls.	Value.
Sept.	1,590.14	$1,990.44
Oct.	1,328.31	1,517.63
Nov.	866.32	996.26
Dec.	1,118.10	1,285.81
Total	4,902.87	$5,790.14

Central Producing & Refining Co.

1924	Bbls.	Value.
Jan.	683.48	$1,196.09
Feb.	1,467.04	2,837.10
Mar.	974.92	2,118.09
Apr.	832.23	1,914.09
May	1,147.05	2,476.40
June	1,222.22	2,240.34
July	163.80	278.46

Copper Flash Oil Co.

1924	Bbls.	Value.
Aug.	1,899.24	$2,583.05
Sept.	1,507.86	1,848.00
Oct.	1,118.72	1,268.38
Nov.	1,139.84	1,367.80
Dec.	755.84	907.00
Total	12,912.24	$21,034.80

Copper Flash Oil Co.

1925	Bbls.	Value.
Jan.	771.20	$1,059.88
Feb.	1,139.36	2,164.28
Mar.	1,143.36	2,229.55
Apr.	1,129.76	2,203.03
May	1,133.12	2,247.18
June	724.80	1,396.08
July	1,499.08	3,054.41
Aug.	1,492.32	2,003.62
Sept.	1,491.00	2,684.00
Total	10,524.00	$19,042.03

WELL LOG No. 1.

HOPKINS COUNTY

C. S. Williams, No. 1, lessor. Copper Flash Oil Co., Linton, Ohio, lessee. Location: Near Morton's Gap, Hopkins County, Ky. Commenced: Dec. 12, 1921. Completed: Oct. 1922. Production: Petroleum. J. M. Huggins, Driller. Authority: E. A. Powell, supt., July 17, 1923.

Strata	Thickness	Depth
RECENT		
Clay	12	12
PENNSYLVANIAN SYSTEM		
Limestone, (above No. 7 coal)	6	18
Shale, sandy	12	30
Shale, brown	50	80
Shale, black	14	94
Shale, black	16	110
Coal (No. 6?)	3	113
Shale, brown	32	145
Shale, dark	20	165
Shale, black	15	180
Coal	3	183
Shale, white	17	200
Shale, white, hard	20	220
Shale, black, hard	30	250
Limestone, blue	4	254
Coal	6	260
Shale, white	50	310
Sandstone, coarse white	25	335
Shale, gray sandy	45	380
Shale, blue	15	395
Sandstone, coarse white	55	450
Shale, brown	50	500
Shale, light	10	510
Limestone, hard	5	515
Sandstone	85	600
Shale, sandy	50	650
Sandstone	35	685
Shale, black	15	700
Sandstone, white	12	712
Sandstone, black, shaly, limey	23	735
Sandstone, hard	15	750
Sandstone, white, hard	130	880
Shale, black	15	895
Shale, black, sandy	23	918
Shale, black	17	935
Sandstone, white (Artesian)	15	950
Shale, black, hard	42	992

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black "Pencil Cave"	44	1036
Sandstone and shale, brown, hard	50	1086
Shale, white	5	1091
Shale, dark, hard	17	1108
Shale, black	6	1114
MISSISSIPPIAN SYSTEM		
Limestone, dark gray	6	1120
Limestone, black	6	1126
Limestone, white	9	1135
Shale, black, hard	8	1143
Shale, black, hard	11	1154
Limestone, gray	6	1160
Shale, soft	10	1170
Limestone, black	12	1182
Shale, black	18	1200
Limestone, hard	8	1208
Shale, dark	2	1210
Shale, soft black	22	1232
Limestone, black	12	1244
Shale, dark, hard	4	1248
Limestone, hard	16	1264
Shale, green	12	1276
Limestone, hard	17	1293
Sandstone, gray	10	1303
Limestone, hard	19	1322
Shale, black	4	1326
Limestone	4	1330
Shale, soft	9	1339
Limestone	6	1345
Limestone, shaly	5	1350
Limestone, shaly, hard	5	1355
Shale, soft	40	1395
Limestone, light	6	1401
Limestone, hard brown	17	1418
Shale, black	3	1421
Shale, blue	8	1429
Shale, hard	26	1455
Sandstone, coarse	10	1465
Sandstone "Salt Water," flowing water	26	1491
Sandstone, hard	4	1495
Sandstone	20	1515
Shale, black, hard	25	1540
Limestone, hard	24	1564
Shale, blue	7	1571

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, "Red Rock"	5	1576
Shale, blue sandy	52	1628
Limestone, gray	3	1631
Shale, hard, blue	5	1636
Limestone	8	1644
Shale, blue, sandy	43	1687
Limestone, hard	11	1698
Shale, brown	5	1703
Shale, dark green	5	1708
Sandstone, green	18	1726
Shale, green	20	1746
Limestone, shaly	14	1760
Shale, black, hard	5	1765
Shale, black	7	1772
Limestone	3	1775
Shale, blue	13	1788
Limestone, dark	8	1796
Shale, dark blue	8	1804
Limestone, hard black	2	1806
Shale, soft dark	9	1815
Limestone, brown	8	1823
Shale, black	5	1828
Limestone, brown	6	1834
Shale, hard black	4	1838
Limestone, brown sandy	34	1872
Shale, dark blue	18	1890
Limestone, hard	20	1910
Limestone, hard black-oil show	8	1918
Shale, black	21	1939
Sandstone "Salt Water," 4 bailers, hr.	16	1955
Limestone, hard	33	1988
Limestone, hard	5	1993
Limestone, hard black	10	2003
Limestone, hard	26	2029
Shale, red and blue	3	2032
Limestone, hard	25	2057
Limestone, hard (oil 8 bbls., 2057-9)	35	2092
Limestone, white	40	2132
Total depth		2132

Note:—There was over 1100 feet of under reaming done in this hole. All shales caved. Oil production at 2057 feet came from 15 in. of producing limestone "sand." Production at 2057 feet, 8 bbls. Cut-

tings, 1993-2003 feet, showed 2 ft. of red and blue shale; 1988-1993 ft. 2 ft. red and blue shale.

8¼" casing set 260-310 ft. Hole full of artesian water 750-880 ft. 6¼" casing set 1687-1698 ft. 4⅞" casing set 2029-2032 ft.

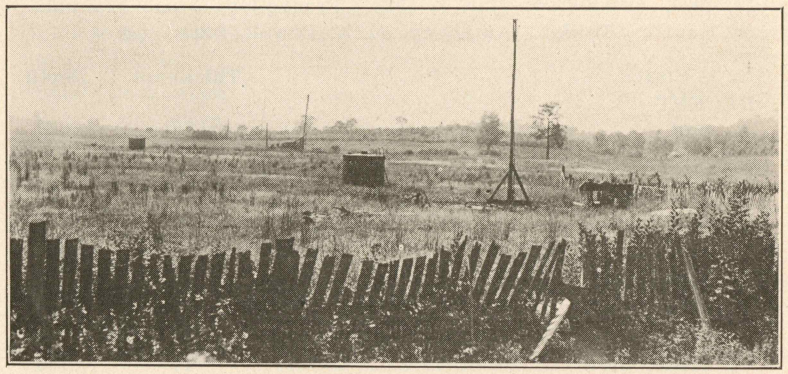
WELL LOG No. 2.

C. S. Williams, No. 2, Lessor. Copper Flash Oil Co., Lessee. Location: Near Morton's Gap, Hopkins County, Ky. Commenced: Feb 15, 1923. Completed: Mar. 2, 1923. Production: Flush 225 bbls. J. M. Huggins, Driller. Authority: E. A. Powell, Supt.

Strata	Thickness	Depth
RECENT		
Soil	12	12
PENNSYLVANIAN SYSTEM		
Limestone	6	18
Shale, blue	9	27
Limestone	13	40
Sandstone	25	65
Shale, brown	7	72
Shale, gray	14	86
Shale, dark	14	100
Limestone	5	105
Sandstone, gray	20	125
Sandstone	15	140
Shale, sandy	10	150
Shale, brown	5	155
Shale, black	5	160
Shale, gray	20	180
Shale, gray	20	200
Shale, gray sandy	15	215
Sandstone, white	10	225
Shale, gray	10	235
Shale, brown	10	245
Limestone, hard	5	250
Sandstone	8	258
Shale, and coal	6	264
Shale, gray	20	284
Shale, brown	30	314
Sandstone, brown	25	339
Sandstone, shaly	25	364
Sandstone, sharp	10	374
Shale, black	20	394
Sandstone, shaly	20	414
Sandstone, gray	10	424
Sandstone, gray	20	444
Shale, brown	11	455

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black	10	465
Sandstone (oil)	30	495
Sandstone, dark	5	500
Total depth		500′

Note:—This well is entirely in the Coal Measures.



THE HOLEMAN LEASE.
This property has three good wells and one dry hole at the present time. The wells are about 515 feet deep. View looking southwest.

WELL LOG No. 3.

C. S. Williams No. 3, Lessor. Copper Flash Oil Co., Lessee. Location: Near Morton's Gap, Hopkins County, Ky. Drilled: April, 1923. Production: Flush 24 bbls. Driller: J. M. Huggins. Authority: E A. Powell, Supt.

Strata	Thickness	Depth
RECENT		
Soil	14	14
PENNSYLVANIAN SYSTEM		
Limestone	6	20
Shale, brown	20	40
Sandstone	40	80
Limestone	4	84
Coal	2	86
Shale, white, limy	34	120
Shale, sandy	20	140
Shale, hard	5	145
Shale, brown	55	200
Sandstone, white, sandy	40	240
Shale and crop of coal	5	245
Sandstone, white, shaly	55	300
Shale, white	50	350
Shale, white, limy	50	400

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black	39	439
Shale, hard	12	451
Shale	10	461
Shale, hard	12	473
Sandstone (oil)	12	485
Shale, hard	10	495
Shale, limy	11	506
Shale, dark, hard	70	576
Shale, sandy	58	634
Shale, light	56	690
Shale, brown	11	701
Total depth		701′

Note:—This well was completed in the Coal Measures and was shot at 485 feet after plugging back to 500 feet.

WELL LOG No. 4.

C. S. Williams No. 4, Lessor. Copper Flash Oil Co., Lessee. Location: near Morton's Gap, Hopkins County, Ky. Commenced: ——. Completed: May 18, 1923. J. M. Huggins, Driller. Production: Dry.

Strata	Thickness	Depth
RECENT		
Soil	11	11
PENNSYLVANIAN SYSTEM		
Clay, yellow	10	21
Shale, blue	7	28
Sandstone	14	42
Shale, hard	8	50
Shale, round	28	78
Shale, light	8	86
Shale, gray	9	95
Limestone	5	100
Coal	2	102
Shale, gray	15	117
Limestone	3	120
Shale, brown	30	150
Shale, black	9	159
Coal	3	162
Shale, brown	20	182
Shale, hard	6	188
Sandstone, gray, sandy (gas)	27	215
Sandstone, gray, sandy	10	225
Shale, black	17	242

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Coal	3	245
Shale, limy	5	250
Shale, brown	20	270
Shale, limy	20	290
Sandstone, white	30	320
Shale, dark	20	340
Shale, light	23	363
Shale, shelly	3	366
Shale, light, hard	12	378
Shale, shelly	5	383
Shale, hard	14	397
Sandstone, gray	17	414
Shale, gray	14	428
Limestone	2	430
Shale, gray	21	451
Shale, dark	6	457
Shale, gray	6	463
Shale, gray	6	469
Shale, black	19	488
Shale, sandy	12	500
Shale, black	6	506
Shale, sandy	6	512
Shale, light sandy	8	520
Shale, dark	5	525
Shale, black	11	536
Sandstone	41	577
Total depth		577′

Note:—At 544 salt water was encountered with black paraffin oil showing. This well was completed in the Coal Measures.

WELL LOG No. 5.

Drake No. 1, Lessor. Copper Flash Oil Co., Lessee. Location: Near Morton's Gap, Hopkins County, Ky. Commenced: July 10, 1923. Completed: ——, ——. Randolph and Stevenson, Drillers. Authority: E. A. Powell, Supt.

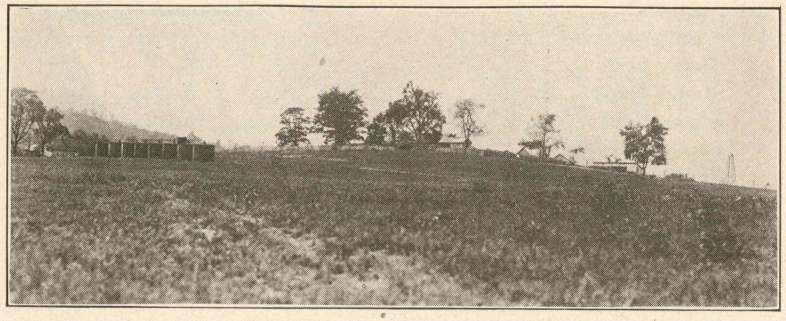
Strata	Thickness	Depth
RECENT		
Clay	22	22
PENNSYLVANIAN SYSTEM		
Shale, black	8	30
Shale, blue	10	40
Shale, gray, sandy	10	50
Shale, blue	15	65

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, light	25	90
Shale, black	5	95
Shale, light	43	138
Sandstone, gray	12	150
Shale, soft blue	15	165
Shale, sandy	14	179
Shale, light soft	21	200
Shale, brown	35	235
Shale, gray	7	242
Limestone and sandstone—oil show	10	252
Shale, white	9	261
Sandstone, brown	2	263
Shale, blue	23	286
Shale, white sandy	14	300
Sandstone, light brown	17	317
Shale, brown	11	328
Shale, blue	2	330
Limestone, black	7	337
Shale, white	16	353
Shale, white, limy	22	375
Shale, blue limy	17	392
Shale, black	6	398
Shale, blue sandy	33	421
Shale, blue	18	439
Total depth		439′

WELL LOG No. 6.

Ashley Holloman No. 1, Lessor. Copper Flash Oil Co., Lessee. Location: Near Morton's Gap, Hopkins County, Ky. Commenced: May 24, 1923. Production: Flush 50 barrels. T. L. Stricklein, Driller. Authority: E. A. Powell, Supt.

Strata	Thickness	Depth
RECENT		
Clay	17	17
PENNSYLVANIAN SYSTEM		
Limestone, hard blue	11	28
Shale, blue	7	35
Limestone, white	107	142
Shale, blue and white	26	168
Sandstone, white	9	177
Shale, soft blue	40	217
Shale, white and fire clay	16	233
Shale, soft blue	35	268



TANKS ON WILLIAMS FARM.
No. 1 pump is used for pumping three wells. J. M. Huggins of Sullivan is the driller.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, white and fire clay	15	283
Shale, soft blue	40	323
Shale, white	16	339
Shale, dark	40	379
Shale, white	15	394
Shale, dark	32	426
Limestone, shaly, sandy	13	439
Shale, dark, sandy, limy	32	471
Shale, brown	9	480
Shale, hard black	11	491
Sandstone "oil sand"	20	511
Total depth		511′

WELL LOG No. 7.

Earlington Well.*

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone	192	192
Shale	17	209
Shale and sandstone	9	218
Coal	1	219
Shale	45	264
Shale, dark, thin coal	5	269
Shale	23	292
Sandstone, with shale	27	319
Shale, sandy, hard (Cap)	1	320
Sandstone, white—water	47	367

*Revised from Oil and Gas Resources of Ky. map. 343-44 Ky. Geol. S. 1920.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, black	2	369
Shale, and coal	2	371
Sandstone	32	403
Shale	2	405
Sandstone—oil show at 418	77	482
Shale	21	503
Sandstone	25	528
Shale	80	608
Sandstone	35	643
Shale	9	652
Shale, sandy	19	671
Sandstone	130	801
Shale, pebbly	12	813
Sandstone	6	819
Limestone, blue	12	831
Shale	13	844
Sandstone	78	922
Shale	15	937
Sandstone	5	942
Coal	3	945
Sandstone	105	1050
Shale	1	1051
Sandstone	46	1097
Shale	2	1099
Sandstone, shale breaks	23	1122
Sandstone	12	1134
MISSISSIPIAN SYSTEM		
Shale	4	1138
Limestone	12	1150
Shale, red	20	1170
Sandstone	5	1175
Shale	15	1190
Sandstone	14	1204
Shale, blue	10	1214
Sandstone	11	1225
Shale, limy	32	1257
Sandstone	6	1263
Shale, black	9	1272
Shale, soft	44	1316
Total depth		1316′

WELL LOG No. 8.

G. L. & G. W. Clayton, lessors. The Shake-Rag Oil & Gas Co., Inc., lessees. Location: 1 mile N. E. of Friday's School, and N. W. of Madisonville, Ky., Hopkins County. Completed: Nov. 13, 1923. Elevation: about 500 ft. above sea level. Drilled by Harry Cowling. Authority: C. A. Ashby.

Strata	Thickness	Depth
RECENT		
Soil	6	6
PENNSYLVANIAN SYSTEM		
Sandstone	4	10
Shale, dark	10	20
Shale, dark, and sandstone	22	42
Coal (bone)	5	47
Shale	17	64
Sandstone (water)	4	68
Shale, black	27	95
Shale	7	102
Coal	8	110
Fire clay	25	135
Sandstone and limestone	20	155
Shale, black	95	250
Shale, white (soft)	25	275
Sandstone, hard	15	290
Shale, black	31	321
Coal	7	328
Sandstone, hard, white	10	338
Fire clay and shale	55	393
Coal	6	399
Fire clay	11	410
Limestone, gray and black	7	417
Sandstone, hard	3	420
Limestone, black	80	500
Shale	5	505
Coal	3	508
Fire clay	6	514
Limestone, soft	6	520
Shale	10	530
Shale, light	10	540
Shale, black	10	550
Limestone, hard	8	558
Fire clay	14	572
Limestone, hard black	20	592
Limestone and shale	8	600
Sandstone, hard	20	620
Shale, gray, dark	9	629

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale and muck	4	633
Coal and shale, dark	4	637
Shale, dark	29	666
Shale, and muck	9	675
Coal, light show	10	685
Shale and muck	35	720
Sandstone, hard	15	735
Coal	3	738
Fire clay	2	740
Fire clay and shale	6	764
Limestone	8	754
Limestone (hard cap over coal)	3	757
Coal	6	763
Sandstone	2	765
Limestone	3	768
Sandstone, hard	15	783
Sandstone (water)	5	788
Limestone and sandstone	4	792
Limestone	4	796
Limestone and sandstone	4	800
Sandstone, hard	18	818
Shale, sandy	12	830
Shale, black	10	840
Shale and coal	5	845
Coal	5	850
Limestone, gray	5	855
Limestone and sandstone mixed	5	860
Limestone, sandy	5	865
Sandstone, gray	5	870
Shale and sandstone	10	880
Shale, black	15	895
Coal	5	900
Shale, green	5	905
Sandstone, white and gray	5	910
Sandstone, coarse, gray-brown; oil smell	15	925
Sandstone, dark	5	930
Sandstone and shale, dark	32	962
Shale, dark	23	985
Coal	5	990
Sandstone, gray and coal mixed	5	995
Sandstone, brown	5	1000
Sandstone, hard brown	25	1025
Sandstone, brown, small oil show	10	1035
Sandstone, dark	15	1050
Sandstone, dark and shale	25	1075

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black	15	1090
Coal	5	1095
Coal and fire clay	5	1100
Shale, light and dark	16	1116
Sandstone, light and dark mixed	5	1121
Shale, dark and sandstone	8	1129
Sandstone	6	1135
Shale and sandstone	5	1140
Shale, dark and light	4	1144
Shale and coal	3	1147
Fire clay and dark shale	5	1152
Fire clay and muck	6	1158
Shale and sandstone mixed	17	1175
Coal and shale	10	1185
Shale, soft	10	1195
Shale	5	1200
Shale, sandy	10	1210
Sandstone (water)	4	1214
Total depth		1214′

Note: This well was completed in the Coal Measures.

LOG No. 9.

Pools, No. 3, lessor. Moss Hill Oil & Gas Co., lessee. Location: 2 miles south of White Plains, and ½ mile from well No. 2 on this farm. Completed: in 1918. Production: at first was about 5 bbls. per day: oil is in this well now, but is not being pumped out, August, 1920. Authority: L. E. Littlepage.

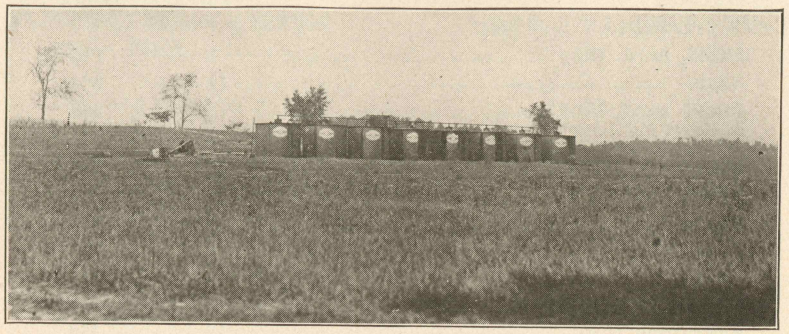
Strata	Thickness	Depth
RECENT		
Clay	3	3
Clay and gravel	7	10
PENNSLYVANIA SYSTEM.		
Clay, sandy	17	27
Shale, hard, limy	1	28
Fire clay	7	35
Shale, soft	25	60
Shale	22	82
Shale, hard	2	84
Fire clay	12	96
Shale	7	103
Shale, hard	6	109
Shale, sandy	36	145
Shale, soft	41	186

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, hard, limy	2	188
Shale	12	200
Shale, hard, limy	3	203
Shale, soft	5	208
Sand rock, gray	42	250
Shale, soft	4	254
Shale, hard	3	257
Fire clay	8	265
Shale	75	340
Limestone and shale	10	350
Sandstone (oil)	10	360
Sandstone, white	7	367
Shale	5	372
Limestone and shale	63	435
Sandstone, (water)	5½	440½
Total depth		440½

LOG No. 10.

Pools, No. 2, lessor. Moss Hill Oil & Gas Co., lessee. Location: 2 miles south of White Plains. Completed: in 1918. Production: Flush 20 bbls. pumped; now the well stands 300 feet in oil, August, 1920. Authority: L. E. Littlepage.

Strata	Thickness	Depth
RECENT		
Clay and soil	19	19
PENNSYLVANIAN SYSTEM		
Coal	1	20
Fire clay	13	33
Sandstone	7	40
Shale	4	44
Shale, hard, limy	3	47
Shale	43	90
Fire clay	6	96
Shale	29	125
Shale, hard, limy	7	132
Shale	37	169
Shale, hard, limy	1	170
Shale	65	235
Sandstone	9	244
Shale, soft	1	245
Sandstone	5	250
Fire clay	3	253
Shale, hard, limy	1	254



View of Tanks on the Williams Farm.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale	24	278
Shale, hard, limy	12	290
Shale	27	317
Coal	1	318
Shale	20	338
Shale (cap rock), hard	1	339
Sandstone, (oil)	3	342
Sandstone, white	1	343
Total depth		343

LOG No. 11.

Bailey, No. 6, lessor. The Moss Hill Oil & Gas Co., lessee. Location: ⅛ mile north of White Plains. Completed: in 1919. Authority: L. E. Littlepage.

Strata	Thickness	Depth
RECENT		
Soil	15	15
PENNSYLVANIAN SYSTEM		
Shale, hard	10	25
Sandstone	10	35
Shale, gray	25	60
Sand and shale	60	120
Shale, shelly	4	124
Shale, brown	51	175
Sandstone	15	190
Shale	50	240
Sandstone	20	260
Shale	90	350
Shale, shelly	5	355

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, (oil)	5	360
Shale	20	380
Limestone	15	395
Shale, brown (pencil cave)	155	550
Sand, (water)	155	705
Shale	10	715
Sandstone, broken	15	730
Shale, brown	20	750
Sandstone	5	755
Limestone, brown, and shells	20	775
Shale	10	785
Limestone (cap rock)	3	788
Sandstone, white, (oil)	8	796
Total depth		796

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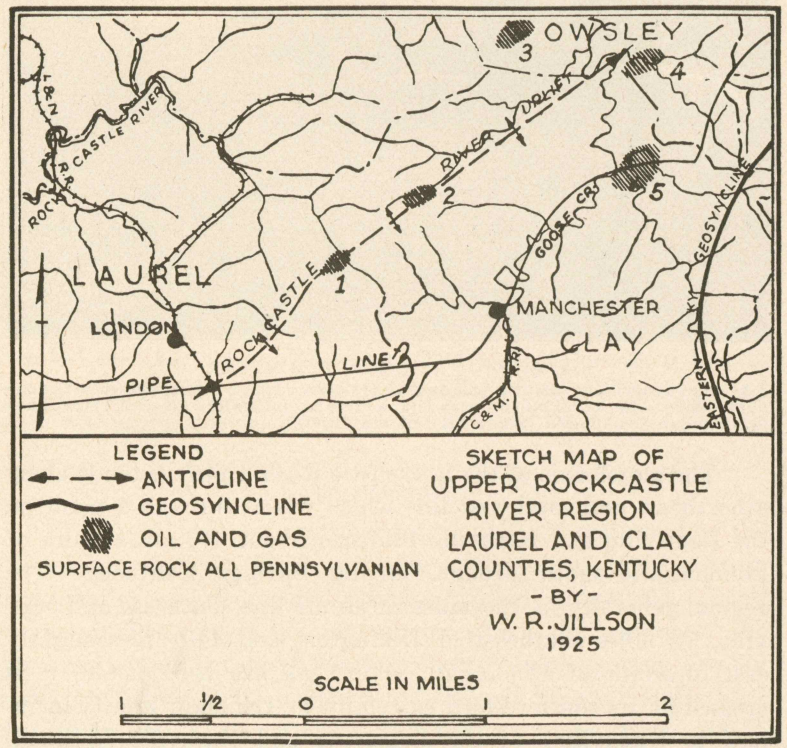
Manuscript written April, 1923.
Revised October, 1925.

VII.

GEOLOGY OF THE ROCKCASTLE RIVER UPLIFT

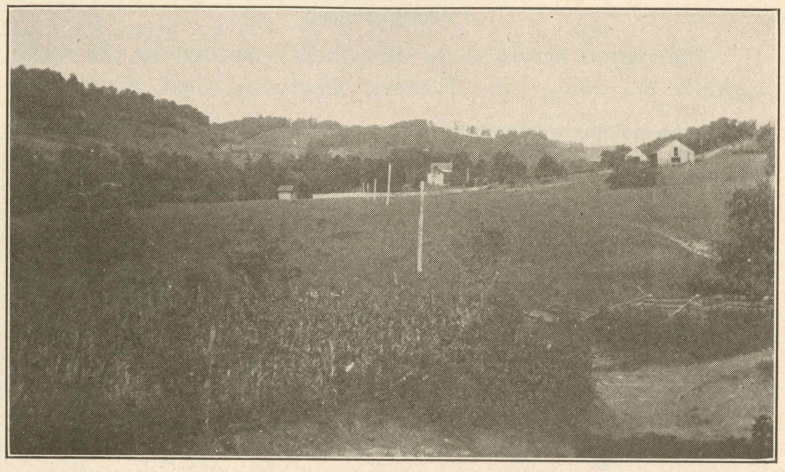
Introduction.

The region herein to be described is located in the southwestern portion of the Eastern Kentucky Coal Field. The



Rockcastle River Uplift is mapped as a unit structure in northeastern Laurel and northern Clay Counties. Unmapped it extends on a distance into Owsley County. It covers an area somewhat over thirty miles in length by ten miles in width. The Laurel County portion lies slightly east of the Louisville and Nashville Railroad right of way on the headwaters of the South Fork of the Rockcastle River and the headwaters of the Laurel River. The Clay County portion lies on the waters of

Sexton Creek, Big Goose, Island, Laurel, Horse Creek, Upper and Lower Teges Creeks, and the South Fork of the Kentucky River. In Owsley County this structure crosses the lower waters of Buffalo Creek.



FORKS OF ROCKCASTLE RIVER
At the confluence of the headwaters forks of the Rockcastle at Larue post office, the hills recede and the widening meanders of the river have produced a broad and beautiful bottom land.

The major axis of the Rockcastle River Uplift extends along a northeast and southwest line which passes through a point on the Louisville and Nashville Railroad about 3½ miles south of London, and again through Burning Springs, Kentucky. The region, generally, is 120 miles in an air line southeast of Louisville, 70 miles southeast of Lexington, and 140 miles slightly east of south of Cincinnati, Ohio. As has been noted, it is crossed on its southwestern extremity by the main line (Cincinnati to Knoxville) of the Louisville and Nashville Railroad. Towns and stations included within the area are Altamont, East Bernstadt, Pittsburg, London, and Farriston.

The region encompasses an area of about 425 square miles. The field work upon which this report is based was done by the writer and his assistant, Mr. J. S. Hudnall, at various intervals totaling altogether about two and one-half months in 1918 and 1922. The U. S. Geological Survey Manchester and London reconnaissance topographic sheets (scale of 1:125,000) were used

after being photographed to the scale of 1:62,500. These maps were supplemented by regional manuscript drainage base maps of Sexton and other adjoining creeks prepared by L. M. Sellier for Kentucky Geological Survey, Series IV, in 1917 at a scale of one inch to the mile.

Elevations were run with an aneroid barometer on the Manchester (Lily) coal. As no bench marks had been established in the Laurel County portion of this field, an additional aneroid was read at London for checking purposes. In Clay County spirit level bench marks had been established by the Kentucky Geological Survey in 1917. These are described in the "Coals of Clay County*" and were used for checking purposes. The levels of many of the coal openings in Clay County which are also given in this report were used in conjunction with additional field data in the preparation of the structural map which accompanies this report. Because of the precise levels available in Clay County, this portion of the structural map is regarded as more accurate than that which is located in Laurel County. The structural mapping in Laurel County, however, is regarded as of sufficient accuracy to be used as a safe guide for development in the field.

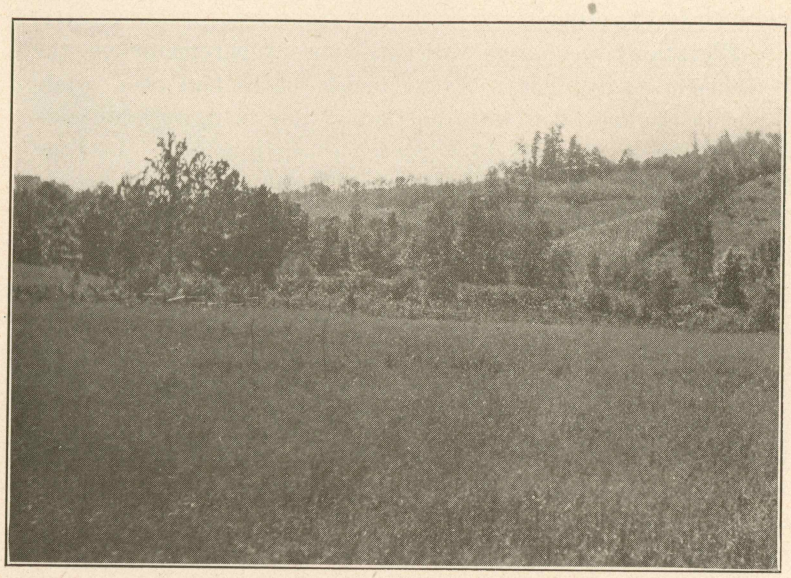
Topography.

Two quite distinct physiographic areas are traversed by the Rockcastle Uplift. The southwestern portion of the Uplift in the vicinity of London and Farriston is an undulating upland plains region. It is the plateau on which the waters of the Rockcastle and Laurel Rivers and their tributaries rise. Broad valleys rather poorly defined and bordered by some swale land is here the rule. Elevations in this vicinity range from 1,100 to 1,200 feet.

East of the Louisville and Nashville Railroad a number of sandstone capped knobs or ridges set in along the crest of the Rockcastle River Uplift. One of these, Frazier Knob, is 1,540 feet high. Another, Laurel Hill about four miles east of London, is 1,563 feet high, and Raccoon Mountain which forms the head watershed of the Right Fork of the Rockcastle River is somewhat

* Coals of Clay County, by P. G. and J. M. Hodge. Ky. Geol. Survey, Series IV, Vol. IV, Part III, 1917. Edition exhausted.

in excess of 1,600 feet above the sea level. These hills essentially coincide with the high points in the main structure and are capped by resistent Coal Measure sandstones. Taken with some high hills located on the northern part of the London sheet and a few



TOP OF THE ROCKCASTLE RIVER UPLIFT
Though a small mountain creek where it crosses the anticline, the Rockcastle River has cut out broad bottoms as are here shown on the farms of Caz Hicks and W. M. Johnson.

isolated knobs found extending to the northeast on the Manchester sheet, which will be described later, these outliers constitute all that is left of the old Cretaceous peneplain.

This old plateau which is now so nearly obliterated, was presumably once continuous with the Cumberland table land of Tennessee. In the London-South region, erosion relentless since the close of the Messozoic has reduced the soft shaley sediments and developed a second or lower plain on the resistant underlying conglomerates. This is therefore a false or sedimentary plain, entirely local in its extent. Two or three hundred feet below it, on an elevation of about 1,000 feet above the sea level, occurs the Lexington plain which is the great central Tertiary peneplain of Kentucky. This lower plain extends as far southeastward as Bee Lick in western Rockcastle County, but was not

able to extend quite into the London region because of the occurrence there, as already noted, of the thick resistant conglomerates at the base of the Coal Measures.

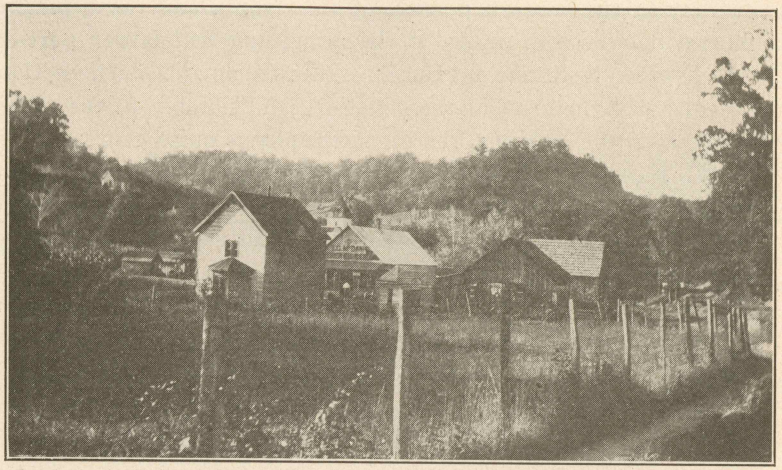
Raccoon Mountain is the actual divide between the plateau country in the western portion of this region and the typically incised dendritic drainage of the remaining and larger portion which extends to the northeast. In this northeastern section, except along the crest of the structure and notably in the vicinity of Burning Springs, the physiography is quite characteristic of the Eastern Coal Field. The valleys are narrow and meandering, and become deeper as one progresses towards the South Fork of the Kentucky River. The hills are elongate, with sharp ridges and steep slopes. For the most part they are forested on the top though frequently the timber is cut away for mountain hillside farms, and in such cases is generally given over to the raising of corn.

Two high knobs, Pilot Mountain and Cradlebow Knob, remnants of the high Cretaceous peneplain, each with an altitude in excess of 1,500 feet mark the northwestward extension of the Rockcastle River Uplift in Clay County. Excluding these isolated knobs the maximum relief in this portion of the region is 800 feet. In the London section, excluding such peaks as Frazier Knob and Laurel Hill, the relief is about 150 feet, and in some places less. The highest elevation in the region is on the top of Raccoon Mountain which is an undetermined elevation in excess of 1,600 feet. The lowest elevation is found on the waters of the South Fork of the Kentucky River near the Clay-Owsley County line where low water is about 700 above sea level.

Stratigraphy

The rocks exposed to the surface within the region of the Rockcastle River Uplift are all of Pennsylvanian age. They have been subdivided by M. R. Campbell into the Breathitt formation and the Corbin conglomerate. The Breathitt formation is at the surface at London and consists of sandy shale and ferruginous sands, and some coals. The Lily (Manchester) coal mined at Pittsburg, Kentucky, occurs in the lower part of the Breathitt formation and generally about 10 or 20 feet above its base. The Breathitt formation shows a variable thickness of 400 to 500 feet.

The Corbin conglomerate, named from Corbin, Ky., is a pinkish, loosely cemented coarse sandstone conglomerate ranging from 100 to 200 feet in thickness. The Corbin conglomerate is a lenticle occurring at the top of the Lee formation. It may be

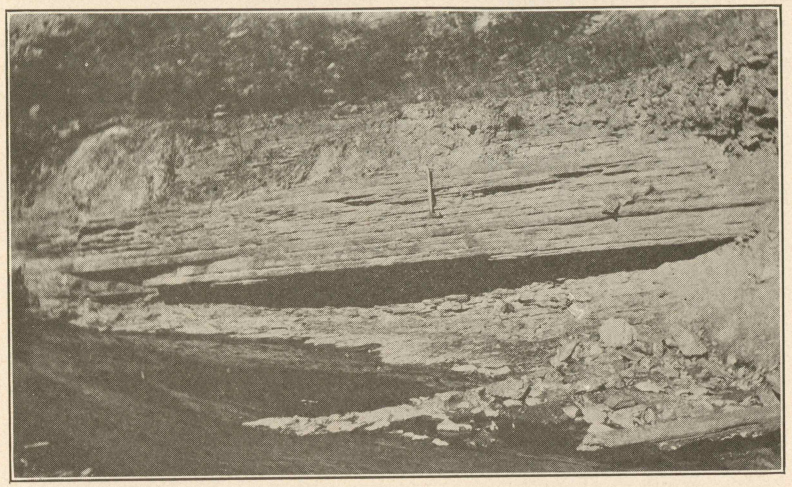


BURNING SPRINGS, KENTUCKY
A picturesque mountain village of perhaps some score or more of stores and dwellings, this town owes its settlement to the occurrence of considerable natural gas seepages here in the bed of Sexton Creek.

seen in the bottoms of the Little Laurel and Big Laurel Rivers and some of their tributaries near Farriston Station on the L. & N. R. R. The top of the Corbin generally approximates that of the drainage level, though on the head of the Laurel River and some headwater branches, it is slightly beneath the drainage. The Lily coal usually occurs from 0 to 20 feet above the top of the Corbin formation. The coals occurring above the Lily (Manchester) coal are the Upper and Lower Blue Gem, the Jellico, the Whitesburg, and the Fire Clay Coals. The Fire Clay coal is limited to the region about lower Teges Creek on the South Fork of the Kentucky River, but it may be found in outcrop close to the top of Raccoon Mountain.

In the extreme western portion of this area, two miles west of the railroad, the Corbin and Rockcastle conglomerates occur in their typical cliff forming ledges. In the vicinity of Manchester, and lower down Goose Creek, there is a clifty sandy shale somewhat modified which may be the Corbin, though this is

not definitely proven. This suggestion, however, is supported by the tracing of the Lily coal up Rockcastle River and over on to the waters of the South Fork of the Kentucky River where it was found to be the Manchester Coal.



TILTED SANDSTONE AT BURNING SPRINGS
Reversal dips of 5° N. 45 E. on the Burning Springs Dome are seen as in this view in Sexton Creek within the limits of the town.

In the vicinity of Burning Springs, Clay County, and for a distance of five miles northeast and four miles southwest of this point along the axis of the uplift there are no persistent thick sandstones, and the horizons at which these sandstones occur elsewhere in eastern Kentucky are represented by sandy shales and carbonaceous shales which grade into cannel shales in certain sections. This shaly phase of the rocks in this section is responsible for the low rolling hills around Burning Springs. It is suggestive of a somewhat different condition here during the period of sedimentation as compared generally to the region which adjoins it.

It is, perhaps, not unreasonable to assume that the region where the anticline is located was one of general weakness even in Pottsville times. A small flexing of the depositional floor accompanied by even a small regional uplift during the Pottsville sedimentation might have developed locally sub-insular conditions separated by some little distance from the typical shore or

delta lines so much in evidence but a few miles to the west or east of this region. The fact that cannel shales and carbonaceous shales are formed in semi-quiescent waters somewhat removed from continental deposits, lends some strength to this view. In any event the preponderance of shales in this section is at once apparent when contrasted with that of the "off-structure" regions adjoining it, and the very persistency with which these shaley areas follow the crest of the Rockcastle River Uplift is in itself suggestive of some actual relationship. The following section measured on Radder Creek is characteristic of the region generally.

Top of ridge, 1,320 ft. A. T., Bar.
10 ft. Shale.
16 ft. 24 in. coal (Jellico-Burns).
30 ft. Sandy Shale
20 ft. Clayey Shale.
10 ft. Covered (Shale?)
15 ft. Dark Shale.
10 ft. Coal and Fire Clay (Upper Blue Gem-Wyatt).
20 ft. Coarse Massive Sandstone.
30 ft. Shale.
10 ft. Covered.
20 ft. Clay Shale.
3 ft. Coal (Lower Blue Gem).
35 ft. Sandy Shale.
25 ft. Sandstone.
30 ft. Shale.
2 ft. Coal Blown (Local, Sacker, Dr.)
40 ft. Black Shale.
10 ft. Sandstone.
3 ft. Coal (Lily-Manchester).
20 ft. Black Shale.
Drainage.

In the region of the headwaters of the Rockcastle River and northeastward the Coal Measures exhibit a section above drainage of about 300 to 400 feet. A study of several well logs drilled in this vicinity shows the subsurface thickness of the rocks of undoubted Pennsylvanian age to be about 650 feet. The complete thickness of the Coal Measures in this part of Laurel and Clay Counties is therefore about 1,000 feet. The subsurface portion of this group is largely composed of the Lee Formation and the

Rockcastle conglomerate which are known to be of upper Lower Pottsville age.

Mississippian Group

Underlying the sediments of Coal Measure age and separated from them by a very remarkable unconformity, there occurs a series of limestones, shales, and thin sandstones of about 750 feet in thickness which are recognized as of Mississippian age. These rocks are nowhere exposed to the surface within the region of the Rockcastle River Uplift, but are of extreme importance since they contain the "sands" which are regarded as of first economic importance from an oil and gas producing standpoint. The divisions of these rocks as made by Campbell in 1898 and again by Butts in 1922 are indicated in the accompanying table.

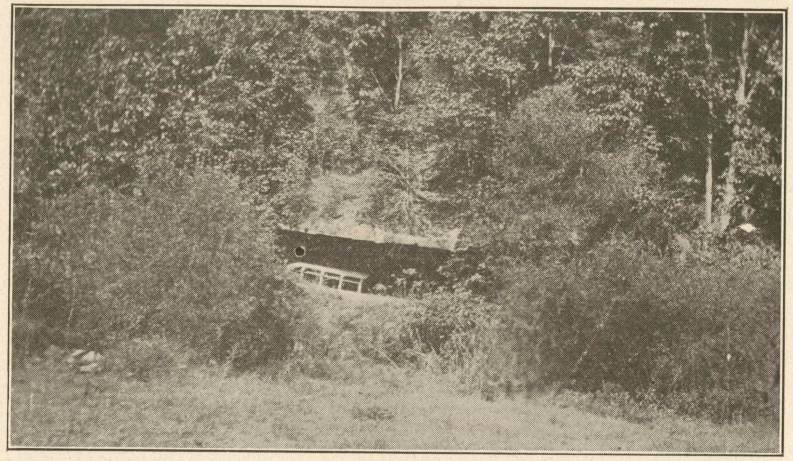
SECTIONS OF THE MISSISSIPPIAN SERIES

Generally Applicable to Eastern Laurel and Northern Clay Counties, Kentucky.

Pottsville Group (Lower Pennsylvanian).

Mississippian of Campbell.	Mississippian of Butts.
Pennington Shale (0 to 150 feet. Red and Green Shales and thin beds of limestones.)	Pennington Formation. (Red and Green Shales and fine grained thin layered sandstone, occasional brown limestone—The correlative of the "Buffalo Wallow Formation" of Western Kentucky.
Newman limestone (225 feet. Blue limestone with nodules of chert and cherty limestone at base.)	Glen Dean Limestone (Blue crinoidal, limestone) Gasper Limestone. (Thickbedded, gray oolitic, crinoidal.) Ste. Genevieve Limestone (thickbedded gray oolitic) St. Louis Limestone (Thickbedded, bluish to gray cherty limestone.)
Waverly formation (350 feet. Greenish, calcareous and argillaceous sandstones. Light blue clay shale with iron concretion at base.)	New Providence Group (Thin bedded shales, limestones and sandstones underlain by soft diagonally cleaving sandstone. (Logan Formation) underlain by green shale with iron nodules and thin shaley sandstones (Cuyahoga Formation).
Chattanooga Shale (Upper Devonian)	Chattanooga—Ohio Shale.

Subadjacent to the lowermost strata of Mississippian age occurs the well known Chattanooga Black Shale of upper Devonian age. Well records show this shale to range in thickness from 125 to 140 feet in this region. It is underlain by 20 to 35 feet



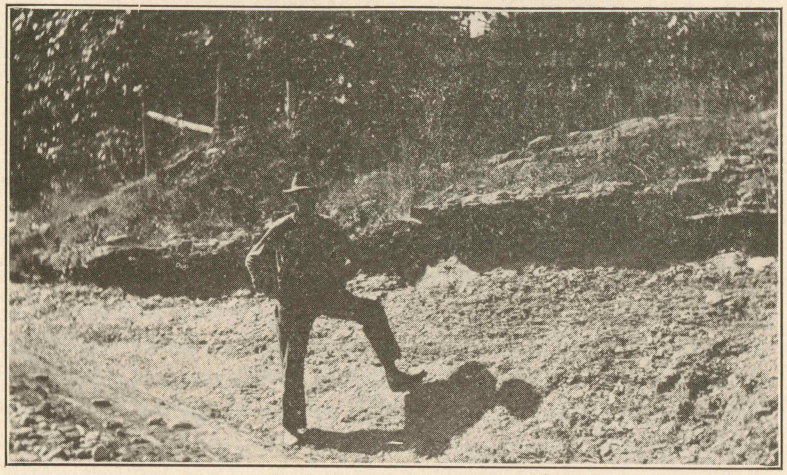
A STRONG NORMAL DIP
On the head of the Rockcastle River there are many points such as this where the lower sandstones brought up by the Rockcastle River uplit, show normal dips to the southeast of 3 and 4 degrees.

of light colored calcareous shale, which in turn rests upon a rather harder cherty limestone recognized by drillers as "Irvine sand." This limestone is also Devonian, and is possibly of Hamilton-Onondaga age. It varies from a few feet to 25 or 30 feet in thickness and is underlain by some rather impure limestones of undoubted Silurian age. Campbell has referred this entire group of limestones and shales immediately below the Chattanooga Black shale to the Panola formation. The type locality of outcrop is at Panola Station in Madison County, Kentucky.

At still greater depths underlying the Panola formation occur a long series of limestones, and shaley limestones of green, pink, and grayish color which are of Ordovician age. This latter group includes the well known "Sunnybrook" and "Trenton" oil "sands" which are productive of oil and gas in commercial quantities, southwest of this region in Wayne, Russell, Clinton, Cumberland, and Monroe counties.

Structural Geology

The Rockcastle River Uplift is an elongated doming anticline. Its general position and anticlinal figure was noted by the writer in 1918 during the course of private field examinations in



REVERSAL ON BURNING SPRINGS DOME
Just east of the Macedonia Baptist Church near Burning Springs post office reversal dips of 5° N. 65 W. may be seen as above in shaley sandstones at the side of the road.

Clay County, but its formal figure was not completely defined until the Fall of 1922. The major axis of the Rockcastle River Uplift crosses the Louisville and Nashville Railroad 1¼ miles north of Farriston, in Laurel County, and extends in a northeasterly direction across the headwaters of the Rockcastle River into Clay County through Burning Springs, and taking the double between Sexton Creek and the lower tributaries of the Big Goose Creek, it crosses the South Fork of the Kentucky River slightly north of Teges P. O., and proceeds into Owsley County on the lower waters of Buffalo Creek, a distance of over thirty miles.

This great structure culminates in three domes (See map of the Rockcastle River Uplift in Laurel and Clay counties, Kentucky, accompanying this report). 1. Slightly southwest of Brock P. O. on the headwaters of Rough Creek of Laurel River. 2. Near the headwaters of the Right Fork of Rockcastle River. 3. On the headwaters of Spring Fork of Sexton Creek near

Burning Springs. Leveled on the Lily (Manchester) coal as keybed. 1. The Rough Creek Dome is 1,210 feet high. 2. Rockcastle River Dome is 1,220 feet high; and 3, Burning Springs Dome is 1,140 feet high. It will be seen from a comparison of these levels that the Rockcastle River Dome is the highest point on the structure. The western or upper part of the Rockcastle River Uplift gives closure on the 1,140 foot contour. The Rough Creek Dome (No. 1) therefore has a closing reversal of 70 feet; the Rockcastle River Dome (No. 2) has a closing reversal of 80 feet; and Burning Springs Dome (No. 3) closing at 1,120 feet, showing a closing reversal of 20 feet.

The maximum anticlinal reversal of the Rockcastle River Uplift, however, is much greater. On the Rockcastle River a synclinal basin (No. 10) at Chester P. O. shows a minimum elevation of 990 feet, giving a reversal for the Rockcastle River Dome (No. 2) of 230 feet. On the headwaters of the Little Laurel River three miles slightly to the northeast of London minimum synclinal elevations of 1,080 feet are found, giving a full reversal of the Rough Creek Dome (No. 1) of 130 feet. Minimum synclinal elevations of 920 feet are found on Sexton Creek, one mile southeast of Malcolm P. O., giving a maximum reversal for the Burning Springs Dome (No. 3) of 220 feet. A minimum synclinal elevation of 750 feet is found where the structure crosses the South Fork of the Kentucky River. Crestal elevations at this point are 830 feet giving a plain anticlinal reversal, but no closure, of 75 or 80 feet in the vicinity of the Owsley County line.

A study of the structure as drawn on the Lily (Manchester) coal shows that the Rough Creek and Rockcastle River Domes (Nos. 1 and 2) are not only the highest points on the structure, but are the areas of greatest compression. Seventy feet of normal dip and 70 feet of reversal on the Rockcastle River Dome (No. 2) is found within 1½ miles measured on a line transversed to the major axis of the structure on the Rough Creek Dome (No. 1). The same amount of normal and reversal dip measures 1 5/8 miles, while on the Burning Springs Dome (No. 3) the first 70 feet of normal reversal dip requires a distance of 2¾ miles.

The Rockcastle River Uplift, though one of the longest, isolated unit structures in Kentucky, bears an additional distinction in that it is not faulted. Particular attention was given to the possibility of the occurrence of a fault on the north flank of this anticline in accordance with the characteristic of many other large anticlines in Eastern Kentucky, but except for one or two very minor breaks of less than a foot in displacement and of no considerable linear extent, the region may be said to be without any faults. Certainly there are no faults present of a magnitude which might be regarded as detrimental or of importance to the accumulation of petroleum and natural gas in the 'sands'' of the region. In the Rockcastle River region compression forces were so great, however, as to incline the strata to 10 and 15 degrees in many places; and it is thought that had the pressure not been released or further compensated elsewhere at the time it was, that this section would logically have been the first to have been faulted. Reasoning in this manner it would be logical to expect one or more faults of considerable size in the structurally unmapped territory to the northwest in Central Rockcastle and Jackson counties. It will be interesting to see what detailed structural work in this northwestern region will ultimately reveal in this connection.

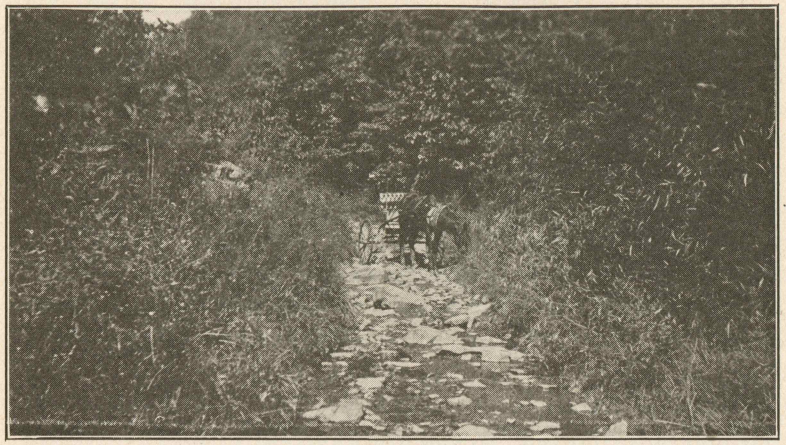
The major axis of the structure from the vicinity of a few miles south of London, proceeds north 50 degrees east generally, with many local fluctuations. The structure when considered as a unit is shaped like an arrowhead pointing to the northeast. It is 2½ miles wide in the vicnity of the South Fork of the Kentucky River, and in the neighborhood of the Rockcastle River, its apex, it is between 8 to 9 miles wide. While the structure in the region of the South Fork of the Kentucky River is somewhat constricted and plainly anticlinal, it rapidly widens as one proceeds to the west; and includes a number of minor or flanking anticlines, domes, and basin synclines. The domes and anticlines are most conspicuous on the normal dip. The southeastern flank in the vicnity of Manchester shows a small dome, and another in the vicnity of Hooker Branch. The reversal dip shows one low flat doming anticline near Maplesville (No. 7) on Raccoon Creek, and a synclinal dome of very small extent just north of Chestnutburg (No. 4) on the waters of Sexton Creek. This dome at Chestnutburg is regarded as insignificant from an oil and gas standpoint. The northwest flank, or Rockcastle River

Uplift, shows two pronounced basin synclines: one at Chester, P. O. (No. 10) on the Rockcastle River, and one just southeast of Atlanta (No. 9) on the waters of Raccoon Creek. A small dome crosses one-half mile northeast of Viva P. O. (No. 8), but is not regarded as being a part of the main structure since it is separated from the structure by the reversal syncline.

Many striking examples of the influence of the Rockcastle River Uplift on the drainage in this region are to be seen in the field. Some of these may be noted on the map. Within general limits and with the exception of the headwaters of the Rockcastle River, both forks of which cross the main structure transversely, the strata dip with the drainage. It is also noted that in one or two places the principle of stream piracy has operated to modify the headwaters drainage. In Clay County the crest of the structure follows very closely the divide between Sexton Creek and the waters of Goose Creek. In Laurel County the crest follows generally the divide between the waters of the South Fork of the Rockcastle River and the waters of the South Fork of the Kentucky River and the Laurel River.

Grays Fork of Little Goose Creek, however, has stealthily crept over the crest of the anticline and stolen some of the headwaters drainage of the Rockcastle River. In the same way the Rockcastle River has forced its headwaters southeastward across the crest of the main structure, and pirated some drainage areas which formerly belonged to the Laurel River. The Right Fork of the Rockcastle River is now extending its headwaters southeastward and absorbing the drainage of Little Sandy and Mudgut Creeks, tributary waters to the Laurel River. Other notable examples of stream piracy are to be seen on the waters of the South Fork of the Kentucky River where the principle of uplift has operated to advantage and the change of drainage. While the present drainage as pointed out has been largely influenced by the structure of this region, it is only fair at the same time to again call attention to the fact that the principal knobs or mountains of this region: 1. Frazier Knob, 2, Laurel Hill; 3. Raccoon Mt.; 4, Pilot Knob; 5, Cradlebow Knob, and 6, Rice Knob, are the direct product of structural elevation. Raccoon Mountain, which is the highest point in Laurel County west of the Rockcastle-Kentucky River Divide owes its supremacy in

height primarily to the uplift, the crest of which crosses about one-half mile south of the top of the mountain. This isolated knob rises to an altitude in excess of 1,600 feet above sea level



TOWARD THE HEAD OF THE CREEK

There is but little room for roads at the head of the creeks in Eastern Kentucky. This through road from the Rockcastle River on the headwaters of Little Goose Creek, Clay County, was likely enough an Indian trail up until 1800, and is still an important thoroughfare.

The regional dip in the vicinity of the Rockcastle River Uplift is about 30 feet to the mile to the southeast. This calculation being based upon the distance computed at both to the north and south of the structure where the structure itself is not in effect. Along the northwestern reversal flank the dips range from 40 to 225 feet per mile. Locally there are dips also 5 to 15 degrees in the sandstones and shales. Dips of from 5 to 8 degrees were measured in domestic coal banks. It may be said, however, that these dips though steep are not regarded as unusual since they are measured on the reversal flank where inclinations in excess of normal are to be anticipated.

Dips of 5 or more degrees on the normal ,or southeastern flank of the Rockcastle River Uplift, are rare; but can be found in close proximity to crests of one or two of the domes. The steepest dips are in the vicinity of lower Teges Creek where it crosses the Kentucky River, Burnings Springs, and on the head of Rockcastle River. Undoubtedly other regions of quite as steep a dip might be found, but these show the steepest dips most

clearly. Since these steep dips occur almost without exception near the crest on the structure, the result is a crestal area of very small extent.

As contrasted with the well defined anticlinal major axis of the Rockcastle River Uplift, the bottom of the reversal syncline in Sexton Creek and in Raccoon Creek shows low, flat dips which are indicative of the strength of the rocks along this line of low structural position. The low dips in this syncline have resulted in broadening it and rendering it somewhat poorly defined. The principal drainage of the reversal syncline follows the waters of Sexton Creek from the vicinity of Alger P. O. southwestward through Chestnutburg and Malcolm over the head of Sexton Creek to the main waters of Rockcastle River in the vicintiy of Chester P. O., thence southwestward to the headwaters of Raccoon Creek in the vicinity of Maplesville. At this point the syncline broadens out extending northwestward about four miles to Atlanta P. O. and southwestward with two well defined termini, approaching respectively Pittsburg and London.

While the reversal dips of the Rockcastle River Uplift as have been pointed out fall between 150 and 250 feet to the northwest, the southeast normal dip of the structure as recorded on the Lily (Manchester) coal, extends uninterrupted for 10 or 15 miles. In this distance the coal measure strata fall tetween 400 and 500 feet into the headwaters of the South Fork of the Kentucky River, where the bottom of the Eastern Kentucky Geosyncline is found. At this point the surface rocks again rise toward the southeast as they approch the Pine Mountain fault.

The subsurface rocks of the Mississippian age, however, though similar in the direction of their dips to the coals of the Pottsville rocks above them, drop down more rapidly. This discordance of dips is due not only to the fact that there is a very great erosional unconformity between the rocks of Mississippian age and Pennsylvanian age, but to the rapid thickening of the Pottsville series as one proceeds to the southeast. The Eastern Kentucky Geosyncline therefore becomes less sharply defined on the rocks of Mississippian age than it is at the surface, and in some cases its synclinal figure may be and probably is entirely lost. The net result of the introduction of these combined principles of unconformity and thickening is the extension of the

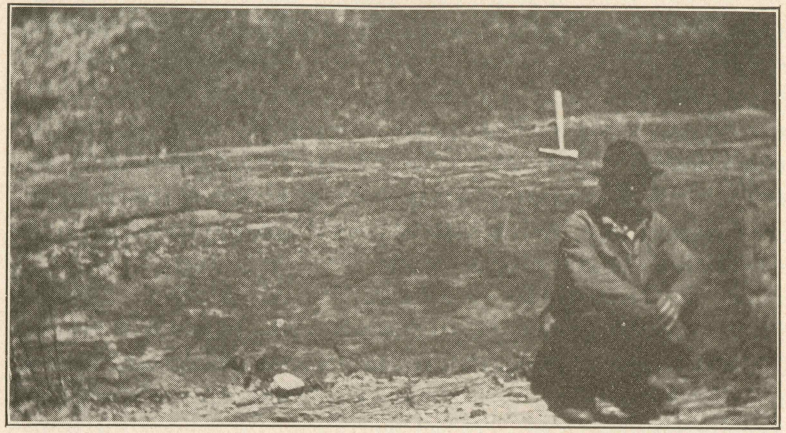
normal dip of the oil and gas "sands" of Mississippian age underlying the Rockcastle River Uplift, to the southeast to the Pine Mountain fault; or to where some now unknown structure results in a reversal.

Though little concentrated drilling has been done on the Rockcastle River Uplift except in the vicinity of Burning Springs, some interpretations of the subsurface structure of this region have been made by the use of a few outlying wells. In making these computations the A. J. Brock and the V. J. Martin wells were used as was the well at Atlanta P. O. A few scattered wells on the headwaters of Gray's Creek were also used. It is found that the Lily (Manchester) coal is found at about 565 feet on the head of Mize Branch on Laurel River. At and near Atlanta P. O. on Little Raccoon Creek it is but 550 feet. The interval is approximately 700 feet on the head of the Little Sandy Creek of Laurel River. and comparisons with other wells drilled in on the waters of Goose Creek and the South Fork of the Kentucky River show a pronounced increase in the interval between the Lily (Manchester) coal and the top of the Big Lime.

This striking increase in interval amounts to as much as 15 feet per mile in the vicinity of the major structure. The rate of increase doubtless is much greater further to the southeast. It is known to be somewhat greater on the Right Fork of Sexton Creek where the interval is approximately about 700 feet. Conclusions derived from this increase of interval seem to indicate a general shortening of the Coal Measure section as the crest of the Rockcastle Uplift is approached. It would seem that the subsurface structure as mapped on the Big Lime is at least 100 or 150 feet higher along crestal structural positions as at Burning Springs, than it should be to correspond exactly with the configuration of the surface structure as worked on the Lily (Manchester) coal.

The high point of the Mississippian structure is also apparently slightly offset to the northwest, as compared to the surface structure. It must be said, however, that due to insufficient data especially along crestal positions in Laurel County these inferences with respect to the subsurface structure should be taken more in the nature of an hypothesis than as an actually demonstrated fact. If upon the completion of considerable drilling at

other strategic points on the structure it is found that the Mississippian fold is proportionately higher along this crest, and that its crest actually offsets the surface structure, it will have been established that in this locality, as in some other localities



REVERSAL ON THE HEAD OF LITTLE GOOSE CREEK

The view is to the east at the side of the road to Folger post office on the head of the Wyatt Branch of Little Goose Creek. Reversal dips of 3° and 4° on even bedded sandstones are found here on the farm of J. D. Greer.

in Eastern Kentucky, particularly in Whitley, Johnson and Magoffin counties, the subsurface structure has been folded twice, the age of the first fold being Post Chester, and the latter Post Pottsville.

If double folding has actually taken place in the region of the Rockcastle River Uplift, it will have operated to bring into bolder relief the subsurface structure in which the prospective oil and gas "sands" of the region occur, and will serve to increase theoretically the gas pressure and the possible size of the oil wells of the field. At the same time it definitely restricts both the productive area of the gas field and the oil field.

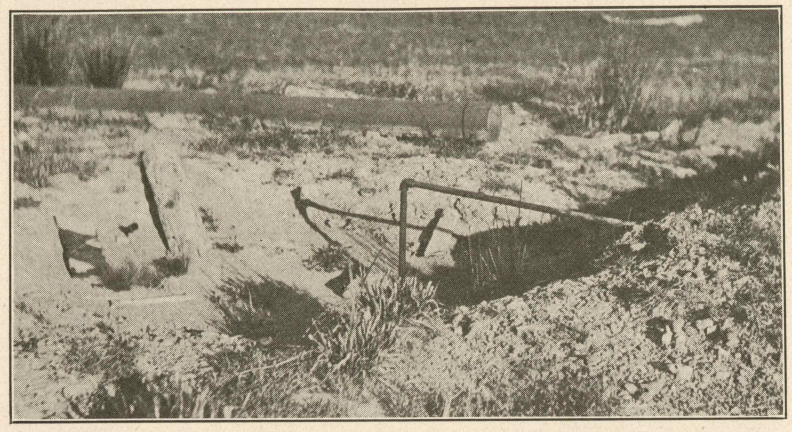
In a structure as large as the Rockcastle River Uplift it must be assumed in advance of drilling to any considerable extent, that the minor structures on both the Northwestern and Southeastern flanks will somewhat control the migration of petroleum and the accumulation of natural gas. As has already been pointed out the Southeastern flank exhibits a strong normal

dip and shows more relative movement than does the dip of reversal. It is impossible now, however, to predict which if any of the minor folds have played the most important part in the accumulation of commercial amounts of oil and gas. The impossibility of doing really refined, structural mapping in this area due to the inadequacy of the base maps available will be felt somewhat by the oil and gas prospector in the development of this field, and as between the reversal and normal dip flanks it may be said that the area from the major axis of the structure to the Northwest has been given more attention in the field in order to more clearly define the surficial configuration of the uplift. Since the field work was done under great difficulties, it is only just to point out that at some later date with accurate topographic base maps prepared at a scale of 1:62,500, it will undoubtedly be found that the figure of the Rockcastle River Uplift will be somewhat modified from the presentation of the map accompanying this report. It will undoubtedly be extended further to the northeast and it is possible, though it is not stated as a postive fact, that it will be extended further to the southwest. This seems not at all unlikely for a number of reasons, chief of which are the noted occurrence of strong reversals near the mouth of Spruce Creek of Laurel River, and are directly southwest of Farriston in line with the axis of Rockcastle River Uplift. It should also be pointed out that elsewhere in Eastern Kentucky structures of as great importance as the Rockcastle River Uplift and extending continuously without a break a distance of from 30 to 40 miles do not in any instance end quite as abruptly as the Rockcastle River Uplift seems to end in the vicinity of Farriston. This uplift has characteristics of a major structural feature of Eastern Kentucky, and the writer feels in the absence of any detailed structural work to the southwest that a continuation of this uplift in some more or less well defined figure will eventually be found and mapped.

Development

At various intervals since 1898 about 20 to 25 wells have been drilled in the vicinity of the Rockcastle River Uplift. Most of these wells have been drilled in closely adjoining Burning Springs in Clay County. Some scattered "wild-cat" locations

have been drilled on the lower waters of Sextons Creek and on the South Fork of the Kentucky River and its tributaries in the vicinity of Oneida. Some of the latter wells drilled on Red Bird and Bullskin Creek by the Oneida Oil and Gas Co. were very



FIRST BURNING SPRINGS GASSER

The well was drilled between 1898–1900 on the L. M. Rawlings farm at Burning Springs, Clay County, Kentucky, to a depth of about 2,200 feet. It produced large quantities of natural gas, but since there was no market for the gas the well was plugged and abandoned. Seepage gas from this well is now being used.

good gassers. Others on the waters of Goose Creek in the vicinity of Manchester, and still others on the headwaters of Laurel River and outlying branches of the Rockcastle River have been gas wells of varying importance. A few wells have been drilled on the head of Grays Fork of Little Goose Creek, and one was located on the head of Mill Creek near Fulger.

With exception of the productive and commercially important natural gas wells which have been drilled in the vicinity of Burning Springs in Clay County, most of the other wells actually drilled on this structure may be said to have been commercially unimportant in their oil and gas production, or else dry holes. Very little accurate data with respect to these drillings has been reported, but such information as it has been possible to secure from various sources is given herewith in the order that the wells were drilled. The writer wishes to acknowledge his obligation to Doctors G. P. Webb and H. C. Hornsby

of Burning Springs through whose kindness he personally secured much of the development data here presented.

1. In 1898 the Brigall Oil and Gas Company organized in Pennsylvania, drilled the first well in the Burning Springs vicinity on the L. M. Rawlings lease just above the town. Drilling was managed by Mr. Brigall, and the hole is reported to have been drilled to a depth of about 2,200 feet by the use of a Standard rig. It is one of the deepest if not the deepest wells in this immediate vicinity. Gas was produced in large quantities but the well was never gauged. It was also allowed to blow open for a long time, and was finally closed in. It is producing gas today for domestic and commercial use in the village of Burning Springs.

2. Five years later, in 1903, a well was drilled on the M. M. Webb farm on Sextons Creek. It produced a small amount of oil and some gas from a depth of about 1,100 feet. A portable rig was used, the drilling being done by Oscar Willison of Washington, D. C. The well was finally abandoned.

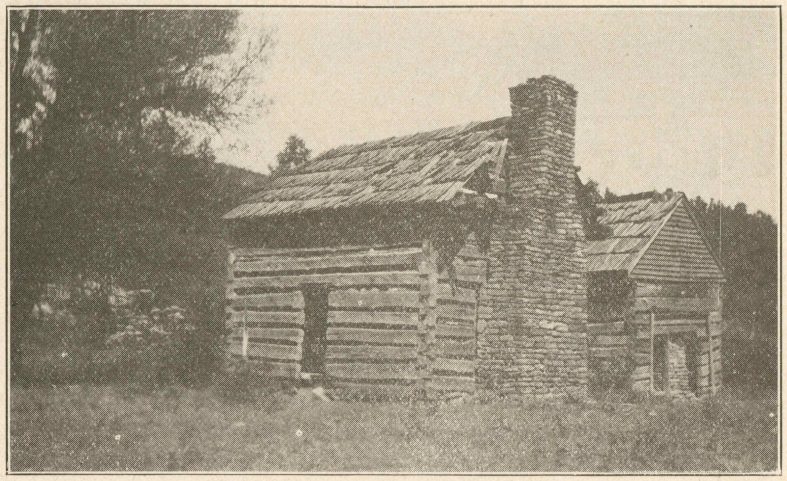
3. During the same year (1903) a well was drilled on the C. C. Shell farm of Sextons Creek which produced a small amount of oil and some gas at a depth of about 1,100 feet. This well was also drilled by Willison. It was also abandoned.

4. During the following year (1904) John Eaton drilled a well on J. L. Rawlings farm on Durham Branch just above the village of Burning Springs to a depth of about 2,000 feet, using a Standard rig. A small amount of gas was secured.

5. Following the completion of the Durham Branch well, Eaton moved on to the E. C. Rawlings farm on Goose Hollow of Burning Springs Fork of Sexton Creek just northwest of Burnin Springs, and in the same year, 1904, drilled in a large gas well at a total depth of 700 feet. This well was guaged at several million feet flush and the rock pressure is reported to have been 285 lbs. This well is now used for domestic purposes in the Burning Springs vicinity. It is owned by the Dulin Oil and Gas Company.

6. In 1904, a well, which was later abandoned, was drilled in at Folger Town on the farm of James Benge on the headwaters of Mill Creek of Rockcastle River, by a Mr. Brown. Its depth is unknown.

7. In 1905 John Eaton drilled in a good gas well on the T. C. McDaniel farm on Burning Springs Fork of Sextons Creek about 1/4 mile below Burning Springs. He used a Standard rig, and drilled to a depth of about 1,200 feet.



A DESERTED MOUNTAIN CABIN
With the passing of the wealth of broad leaf timber which once stood in Laurel and Clay Counties, the soil of the steep hillsides has become badly washed and impoverished. Countless families once independent in their physical comforts have been forced to move on.

8. In the same year, 1905, Captain John A. Geary of Lexington, Kentucky, drilled a small well on the farm of Tom Bonds on Pine Lick Branch of Gum Fork of Sextons Creek. The well was abandoned.

9. After drilling the Bond well Captain Geary in 1905 drilled a well just above the mouth of Laurel Creek of Goose Creek to a depth of about 1,200 feet. This well was dry and abandoned. A portable rig was used.

10. In the same year (1905) a well was drilled on the H. L. Morgan farm 1½ miles above Goose Creek of Laurel River Creek. This well was unproductive and abandoned.

11. In 1909 Captain John A. Geary of Lexington and Whitley City, Kentucky, drilled a well near Tan Yard School, on the farm of Vincent Bowen heirs, on the headwaters of Grays Fork of Little Goose Creek to a reported depth of about 1,300 feet. This well it is said produced a small amount of gas and

some black oil at a depth of 250 to 300 feet. It was finally plugged and abandoned.

12. One-half mile north of the Bowen well, Captain Geary drilled two wells on the Dr. I. C. Wyatt farm on Wells Branch of Grays Fork of Little Goose Creek, about 1912. One of these wells was about 1,100 feet deep and the other about 750 feet in depth. One of these wells is reported to have produced a little oil, but both were abandoned. In 1914 Captain Geary reported the records of these wells had been lost.

13. The Dulin Oil and Gas Company undertook operations in this field in 1912 drilling a well on the J. H. Clark farm just above the mouth of Gun Fork of Sextons Creek at a depth of about 1,500 feet. It is recorded that a small amount of oil and gas production was secured. A standard rig was used, and two wells were drilled through to the "Irvine sand."

14. In the following year, 1913, the Dulin Oil and Gas Co. of Lexington, Ky. drilled a small gasser on the Dr. Hornsby farm. This well was later abandoned. It was located just above the mouth of Burning Springs Fork of Sextons Creek.

15. In 1914 the Dulin Oil and Gas Co. drilled in a good gasser at a depth of 700 feet on the E. Froman farm on Goose Hollow a branch of the Burning Springs Fork of Sextons Creek. The gas was cased off and the drilling was continued to a depth of 1,500 feet, but oil was not found.

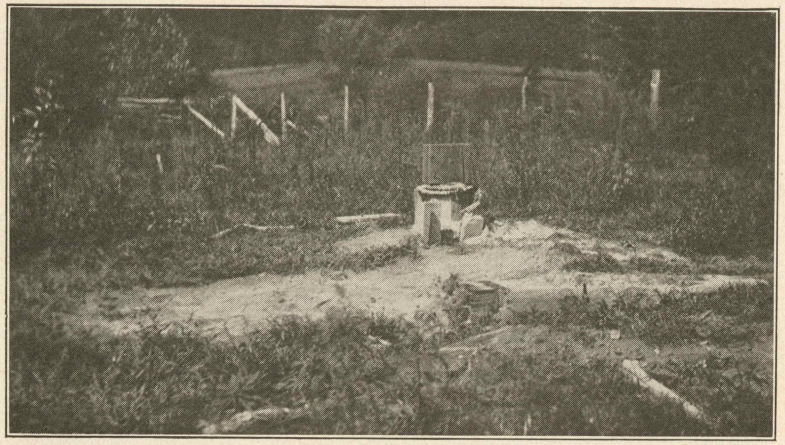
16. In 1914, a dry hole was drilled by the Dulin Oil and Gas Co. to a depth of 1,500 feet on the Nathan Sparks farm on Fox Branch of Sexton's Creek, 6 miles northwest of Burning Springs. It is reported that the well stopped in the "Irvine sand."

17. In the same year, 1914, Charles Snyder, of Chicago, Illinois, drilled a well to a depth of 1,200 feet on the D. C. Sizemore farm two miles above the mouth of Sexton's Creek. The well was a dry hole and was abandoned.

18. Another well was drilled on the N. C. Potter farm on Blue Sow Branch of Grays Fork of Little Goose Creek in the winter of 1917 and 1918 to a depth of 2,202 feet. Dan White of Manchester was in charge of the drilling which was done with the standard rig, and Silas Mann was the contractor. The well

is reported by S. L. Nicholson to have produced a small amount of gas.

19. Later, in 1918, the Ohio Oil Company drilled in the Jasper Mize No. 1 well on Mize Branch of Laurel Creek to a



THE JACK BROCK NO. 1 WELL
This well was drilled by the Petroleum Exploration Company on the head of Little Sandy Creek of Laurel River in the spring of 1921 to a depth of 1,725 feet. Only small amounts of oil and gas were secured and the well was plugged and abandoned.

depth of about 1,500 feet. A portable rig was used. The well was dry and was abandoned.

20 In the fall of 1920 the Petroleum Exploration Company drilled in the V. J. (Willie) Martin No. 1 well on the head of Mudgut Creek of Laurel River to a total depth of about 1,812 feet. The well is reported to have had some shows of oil and gas, but was plugged and abandoned as a dry hole.

21. In the Summer of 1921 the Petroleum Exploration Company drilled in the Jack Brock No. 1 on the head of Little Sandy Creek of Laurel River to a total depth of 1,725 feet, and a small amount of oil was produced at a depth of 300 feet, and a little gas at an unknown depth. The well was abandoned.

Historical.

The occurrence of natural gas on the Rockcastle River Uplift in the vicinity of Burning Springs was known to the Indians prior to the coming of the first white settlers in this portion of

Clay or Laurel Counties. The first white hunters in this vicinity found at Burning Springs implements of the Indians as well as animal skeletal material indicating that the aboriginees had probably made use of the natural gas for cooking purposes. During the period of the settlement of this region forest and grass fires frequently set fire to the escaping natural gas along the sides of Spring Fork of Sextons Creek in the vicinity of what is now the village of Burning Springs.

The natural gas seepage in this vicinity occurs in front of the residence of Dr. H. C. Hornsby. This spring has been known to white men for at least 150 or 200 years. It was used by the early hunters of this region who constructed a rude platform about it and used it for drying wild meat. The natural gas seepages at Sacker springs, one and a half mile northeast of Burning Spring postoffice occur on the land of N. C. Potter and are surrounded by the farm of John Combs. The location is just south of Sacker schoolhouse. The Burning Springs gas springs were used during the early days for drying purposes. Later about 1885 these gas springs were first used commercially for heating a church. Several disastrous fires resulted from the early careless use of natural gas for heating purposes, and as a result practically no attempt was made to use the natural gas in a larger way until after the drilling in of the well on the Rawlings farm in 1898 near Burning Springs, Kentucky.

Well Records

WELL LOG No. 1.

LAUREL COUNTY

Location: 12 miles S. W. of London, Laurel County, Ky. Commenced: ——— Completed: Aug. 1896. Operator: —— Sweeney.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM.		
Sandstone	16	16
Shale	4	20
Sandstone, hard	5	25
Sandstone, soft	20	45
Shale	40	85
Coal	1	86
Sandstone, white	125	211
Shale	70	281
Coal, Cumb. Valley	4	285
Shale	26	311

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM.		
Limestone "Big Lime"	265	576
Sandstone and Limestone	20	596
Limestone, hard	10	606
Shale, black	90	696
Limestone	23	719
Limestone, black sandy	13	732
Shale	10	742
Shale, blue	235	977
Shale, black	55	1032
Shale, red	50	1082
Shale, white	10	1092
Shale, red	20	1112
Shale, green	20	1132
Sandstone "Gas sand"	25	1157
Limestone	347	1504
Total depth		1504′

WELL LOG No. 2.

A. J. Brock, No. 1, lessor. Petroleum Exploration Co., lessee. Location: Headwaters of Little Sandy Creek, one mile southeast of Brock P. O., Laurel County, Kentucky. Commenced: May 31, 1921. Completed: July 9, 1921. Initial Production: Dry hole. Casing head 8¼″ 170 ft., casing head 6⅝″ 837 feet. All pulled. C. H. E. 1,225 A. T., Bar.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM.		
Mud	11	11
Sand, shaley	5	16
Slate, blue	29	45
Sand (fresh water)	65	110
Slate, blue, and lime	50	160
Sand	40	200
Slate, blue	40	240
Sand, first salt	60	300
Slate, black	50	350
Sand, second salt (show oil)	120	470
Slate, blue	30	500
Sand, third salt	140	640
MISSISSIPPIAN SYSTEM.		
Slate, blue and lime	197	837
Limestone (Big Lime)	123	960
Slate, white	25	985

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Lime, blue (hard)	265	1250
Slate, white	130	1380
DEVONIAN SYSTEM.		
Shale, brown	140	1520
Shale, light	20	1540
Slate, white	60	1600
Lime, gritty	125	1725
Total depth		1725′

Note: Drilled fresh water well near this location to the depth of 51 feet.

WELL LOG No. 3.

Vicy J. Martin, No. 1, lessor. Petroleum Co., lessee. Location: Headwaters of Mudgut Creek, 3 miles east of Brock P. O., Laurel Co. Ky. Commenced: March 10, 1921. Completed: May 14, 1921. Initial Production: Dry hole. Casing Head: 8½ in. 68 ft.; 6⅝ in. casing head (17,) 818 ft. All pulled. C. H. E. 1225 A. T., Bar.

Strata	Thickness	Depth
RECENT		
Mud, brown	8	8
PENNSYLVANIAN SYSTEM.		
Shale, sandy	2	10
Shale, blue	50	60
Shale, soft	30	90
Sandstone, (water)	20	110
Shale, blue	60	170
Shale, blue	30	200
Sandstone, "First Salt"	50	250
Shale, black	25	275
Sandstone, "Second Salt"	60	330
Shale, blue	65	400
Shale, and blue limestone	100	500
Sandstone, "Third Salt"	140	640
Shale, black	20	660
MISSISSIPPIAN SYSTEM.		
Sandstone, "Maxon"	10	670
Shale, black	20	690
Shale, pink	10	700
Limestone, "Little Lime"	20	720
Shale, pink	5	725
Shale, light	115	840
Limestone, "Big Lime"	215	1055
Shale, "Fire Clay"	20	1075

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Limestone, gritty	50	1125
Shale, black	25	1150
Shale, white	25	1175
Limestone, blue	150	1325
Shale, white	15	1340
Limestone, gritty	75	1415
Shale, "Fire Clay"	10	1425
DEVONIAN SYSTEM.		
Shale, brown	140	1565
Shale, white	20	1585
Limestone, shelly	5	1590
Shale, "Fire clay"	10	1600
Limestone (Cap Rock)	5	1605
Limestone	79	1684
Limestone, gritty	128	1812
Total depth		1812'

WELL LOG No. 4.

Zach Allen, No. 1, lessor. Piney Oil and Gas Co., Williamsport, Pa., lessee. Location: Southwest of Clay County line about 4,500 feet on Laurel County side of Right Fork of Rockcastle River Commenced: April 10, 1923. Completed: June 15, 1923. Production; Natural gas, 250,000 cu. ft. guaged open flow with 165 lbs. R. P. Well closed in and capped. C. H. E. 1,319 feet A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	3	3
Shale	42	45
Sandstone, water	12	57
Shale	48	105
Sandstone	64	179
Shale	25	204
Sandstone	45	249
Shale	10	259
Sandstone and shale	87	346
Sandstone	104	450
Shale, brown	65	515
Sandstone	14	529
MISSISSIPPIAN SYSTEM		
Shale, pink	6	535
Shale, sandy	35	570
Shale, pink	15	585
Limestone, black	20	605

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Limestone, shale	42	647
Limestone, gray. 660 ft. of 6⅝"	84	731
Limestone, white. 1 gas at 738	19	750
Limestone, brown	40	790
Sandstone, with lime 2nd gas at 827	40	830
Limestone, blue (flinty)	10	840
Shale	14	854
Limestone, blue	56	910
Limestone, blue	185	1095
Shale, blue	14	1109
Limestone, blue	20	1129
Shale, blue	21	1150
Limestone, gray	5	1155
Shale, lime blue	30	1185
Shale, black	54	1239
DEVONIAN SYSTEM		
Shale, brown	84	1323
Shale, "Fire Clay"	5	1328
Limestone	52	1380
SILURIAN SYSTEM		
Shale, blue	21	1401
Limestone, brown	50	1451
Limestone, dark	16	1467
Limestone, blue	58	1525
Limestone, brown	25	1550
Limestone, blue	59	1609
Limestone, brown	9	1618
Limestone, blue	48	1666
Limestone, (fossils) blue	4	1770
Limestone, (gritty) brown	23	1793
Limestone, blue	34	1827
Limestone, (gritty) brown	13	1840
Limestone, blue (fossils)	217	2057
Limestone, brown	35	2092
Limestone, brown	28	2120
Total depth		2120

Casing record 8¼" casing 20 ft.; 6⅝" casing 660 ft.

WELL LOG No. 5.

W. F. Barrett, No. 1, lessor. Standard Oil Co., lessee. Location: Commenced: November 7, 1925. Drilled by Dearolph & Wade.

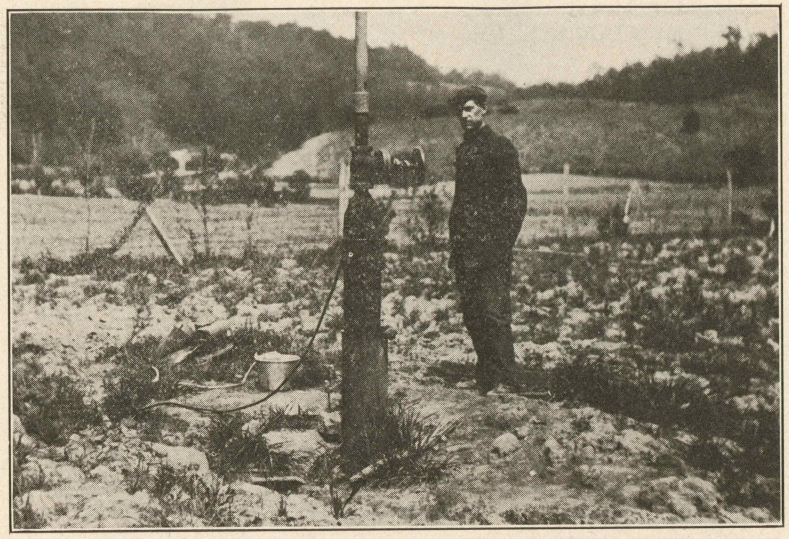
Strata	Thickness	Depth
RECENT		
Soil	10	10
PENNSYLVANIAN SYSTEM		
Shale	17	27
Sandstone	143	170
Shale	185	355
MISSISSIPPIAN SYSTEM		
Limestone	20	375
Shale	20	395
Limestone	40	435
Shale (Pencil Cave)	5	440
Limestone, "Big Lime"	210	650
Shale, brown	25	675
Limestone and sandstone—very hard	55	730
Shale, blue	90	820
Sandstone, (oil at 763)		
Limestone, green, hard	50	870
Shale, blue	20	890
Shale, green	10	900
Limestone, green, hard	40	940
Shale, white, soft	5	945
Shale, blue, soft	20	965
DEVONIAN SYSTEM		
Shale, soft, brown	112	1077
Fire Clay, white	48	1125
Limestone, gray	7	1132
SILURIAN SYSTEM		
Shale, blue	30	1162
Limestone, gray, very hard	28	1188
Limestone, light gray hard	16	1204
Shale, green, soft	11	1215
Limestone, gray, hard	100	1315
Shale, blue, soft	5	1320
Limestone, gray, hard	2	1322
Total depth		1322

Note: Well was shot from 1,204 to 1,180 feet.
8¼ casing 27 ft. 6⅝ casing 411 ft. 5 3-16 casing 500 ft.

WELL LOG No. 5A.

Lee Parker, Lessor. Location: At Mershons, Laurel County, Ky.

Strata	Thickness	Depth
RECENT		
Soil	4	4



A Clay County Gasser Near Oneida.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale	30	34
Sandstone	10	44
Shale	16	60
Sandstone	10	70
Shale	14	84
Coal	2	86
Shale and sandstone	155	241
Coal	3	244
Shale	8	252
Sandstone	25	277
Shale	5	282
Sandstone	20	302
Shale and sandstone	32	334
Sandstone	57	391
Shale	11	402
Coal	2	404
Sandstone, hard, shelly	3	407
Shale	13	420
Sandstone	20	440
MISSISSIPPIAN SYSTEM		
Limestone, dark	10	450
Shale	16	466
Limestone	74	540

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale	5	545
Limestone, hard	17	662
Limestone, soft	33	695
Shale, green	60	755
Shale, white	129	884
Limestone, blue	7	991
Shale, white	58	1049
DEVONIAN SYSTEM		
Shale, black	128	1177
Sandstone, "Corniferous"	7	1184
Shale, and blue limestone	36	1220
Shale, and limestone	57	1277
Total depth		1277

WELL LOG No. 6.

CLAY COUNTY

Leveaga Hubbard No. 1, lessor. Piney Oil & Gas Co., lessee. Location: Crawford, Clay County, Ky., near forks of Rockcastle River. Commenced: June 29, 1923. Completed: Aug. 8, 1923. Contractors: Ensslin & Ensslin.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	12	12
Shale (set 24 ft., 8¼ casing)	20	32
Coal	2	34
Sandstone (fresh water at 30)	60	94
Shale, sandy	116	210
Sandstone	54	264
Shale	46	300
Sandstone	45	345
Shale, sandy	91	436
Sandstone	104	540
Shale	60	600
Sandstone	8	608
Shale	6	614
MISSISSIPPIAN SYSTEM		
Shale, red	6	620
Shale, red and dark	84	704
Shale and limestone	42	746
Limestone, gray and black	37	783
Limestone, gray	37	820
Limestone, white	10	830
Limestone, sandy, brown, gas 927	98	928

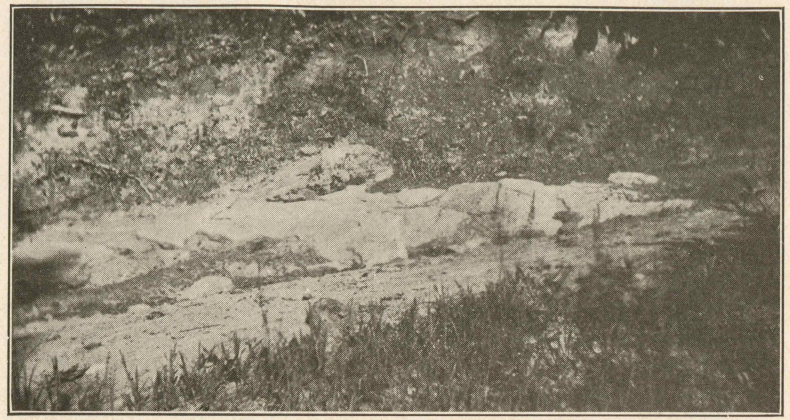
Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale	3	931
Limestone, blue, flinty	54	985
Total Depth		985

755 ft. 6⅝ casing shut off all water, and the hole carried to 985 ft. Quit 6⅝ hole.

WELL LOG No. 7.

W. J. Ledford No. 1, lessor. Standard Oil Co. of Kentucky, lessee. Location: On Harper Branch of Goose Creek, Clay County, Ky. Commenced: November 1, 1924. Completed: December 2, 1924. Contractors: Randell & Fitch. Production: Natural gas, 3,200,000 cubic feet open flow, approximately, with rock pressure of 285 lbs. On March 1, 1925 by actual measurement of agent of Gasoline Recovery Corporation this well produced 2,853,000 cu. ft. according to report.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	7	7
Shale, blue	38	45
Sandstone, light, hard	105	150
Shale, soft, dark	150	300
Sandstone, light, hard	260	560
Shale, dark, soft	20	580
Shale, red, soft	20	600
Shale, dark, soft	15	615
Shale, red, soft	35	650
Sandstone, medium dark	20	670
Shale, soft, dark	45	715
Shale, light, soft	5	720
MISSISSIPPIAN SYSTEM		
Limestone, gray, hard, sandy	15	735
Shale, blue, soft	20	755
Shale, dark, medium sandy	40	795
Limestone, "Big Lime" casing 822	200	995
Sandstone, soft "Big Injun"	15	1010
Shale, soft, red	90	1100
Shale, soft, blue	180	1280
Shale, soft, light	20	1300
DEVONIAN SYSTEM		
Shale, soft, black	173	1473
Shale, soft, brown	15	1488



REVERSAL ON ROCKCASTLE RIVER

This view showing strong sandstones in reversal dips of 3 to 5 degrees may be seen near the forks of the Left Fork of Rockcastle River. Reversal dips to the northwest of 7° and 8° are also to be seen in this locality.

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, hard, black	5	1493
Limestone "Irvine Sand"	27	1520
Total depth		1520

Note: Natural gas was produced from 1,488 to 1,506 feet in depth.

WELL LOG No. 8.

John Meade No. 1, lessor. National Refining Co., lessee. Location: Lower Teges, Clay County, Ky. Commenced: Sept. 1925. Completed: Nov. 1925. Drilled by H. O. Randel. Hole dry, plugged, pulled and abandoned. A small amount of gas in the bottom of the "Big Lime." The showings of oil were just rainbows and it is doubtful if it came from the sand or from the bucket in which the sample was washed out, as it showed grease around the edge which looked to me like some machine oil had been put into the bucket at some time while being used around the rig.

Strata	Thickness	Depth
RECENT		
Soil, yellow	3	3
Clay, yellow	7	10
PENNSYLVANIAN SYSTEM		
Sandstone, gray	27	37
Shale, blue	30	67

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, gray	3	70
Shale, blue	6	76
Sandstone, gray	3	79
Shale, blue	10	89
Sandstone, gray	5	94
Shale, blue	61	155
Sandstone, gray	4	159
Shale, blue	7	166
Sandstone, gray	3	169
Shale, blue	6	175
Sandstone, gray	82	257
Shale, black	10	267
Sandstone, gray	144	411
Shale, blue	49	460
Limestone, black	7	467
Shale, blue	73	540
MISSISSIPPIAN SYSTEM		
Limestone, black	6	546
Shale, blue	14	560
Limestone, "Little Lime," black	12	572
Limestone, gray, "Little Lime"	17	589
Limestone, black	6	595
Limestone, gray, "Big Lime"	230	825
Shale, white	10	835
Shale, green	20	855
Shale, red	54	909
Shale, gray	61	970
Limestone, gray	3	973
Shale, gray	20	993
Limestone, gray	2	995
Shale, gray	135	1130
DEVONIAN SYSTEM		
Shale, brown } "Chattanooga" {	136	1266
Shale, gray } "Chattanooga" {	11	1277
Shale, black } "Chattanooga" {	8	1285
Limestone, gray	9	1294
Limestone, gray	5	1299
Limestone, black	9	1308
Limestone, dark gray, oil show	4	1312
Limestone, gray	8	1320
Limestone, gray, oil show	5	1325
SILURIAN SYSTEM		
Limestone, gray	4	1329
Limestone, black	5	1334

Strata	Thickness	Depth
SILURIAN SYSTEM		
Limestone, black H. H.	13	1347
Limestone, L. gray, sandy	19	1366
Shale, gray	15	1381
Shale, gray	124	1505
Shale, red	45	1550
Shale, gray	45	1595
Limestone, blue	48	1643
Shale, gray	9	1652
Limestone, blue	65	1717
Limestone, black H. H.	15	1732
Shale, black	10	1742
Total Depth		1742

WELL LOG No. 9.

Mobray Robinson, lessor. Petroleum Exploration, lessee. Location: Near Cradle Bow, Clay County, Ky. Commenced: Sept. 1, 1924. Completed: Nov. 18, 1924. Contractor: C. E. Dearolph. Drillers: F. D. Coon and F. W. Wade. Dry hole.

Strata	Thickness	Depth
RECENT		
Soil	4	4
PENNSYLVANIAN SYSTEM		
Shale and shells	26	30
Shale	40	70
Coal	4	74
Shale	16	90
Limestone, shelly	25	115
Shale and shells	205	320
Sandstone, little gas at 330	245	565
Shale	10	575
MISSISSIPPIAN SYSTEM		
Shale, sandy, "Red Rock"	6	581
Limestone, shelly	10	591
Shale	10	601
Shale, sandy "Red Rock"	25	626
Shale, sandy	88	714
Limestone	11	725
Shale	15	740
Limestone "Big Lime"	115	855
Shale, green	50	905
Shale, sandy "Red Rock"	5	910
Shale	20	930

Strata	Thickness	Depth
MISSISSIPPIAN SYSTEM		
Shale, sandy "Red Rock"	10	940
Shale	350	1290
DEVONIAN SYSTEM		
Shale, black, gas at 1,345 (Shale, "Fire Clay", Shale, black — "Chattanooga")	150	1440
Shale, "Fire Clay" ("Chattanooga")	5	1445
Shale, black ("Chattanooga")	7	1452
Limestone, "Corniferous," gas at 1,475	60	1512
Shale, blue	18	1530
Total depth		1530

10" casing 35'. Left in hole 19 ft. 6⅝ casing, X 17 lb., 814, all pulled out. Gas 1,345. Gas 1,475. Authority: Petroleum Exploration.

WELL LOG No. 10.

J. H. Clark, No. 1, Lessor.

Dulin Oil and Gas Co., Lessee.

Location: Just above mouth of Gum Fork of Sextons Creek.

Production: Small oil, green, 1335 to 1360, Nat. Gas at 1337 measured 100,000 cu. ft.

Rig: Standard.

Sands: Salt sand in coal measures about 200 feet thick.

Date: 1917-1918.

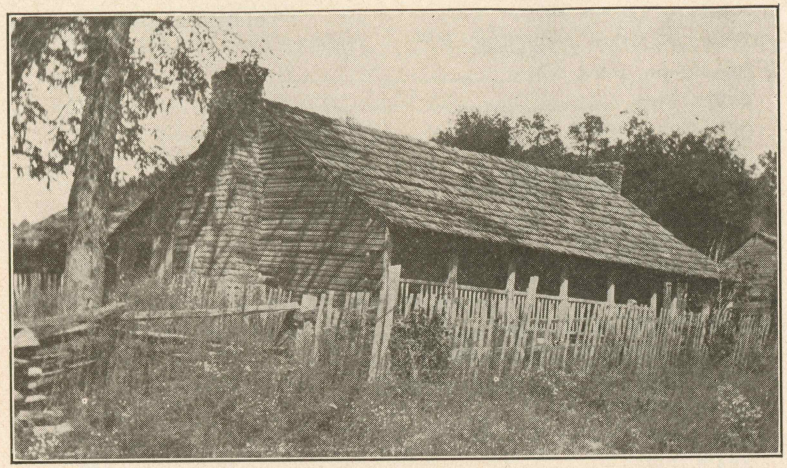
Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM.		
Soil, sandstone, shale & coal	525	525
MISSISSIPPIAN SYSTEM.		
Limestone, white	75	600
Shale, brown	4	604
Shale, blue	6	610
Limestone (Big Lime)	161	771
Shale, soft	11	782
Sandstone, bluish	58	860
Shale, blue	10	870
Shale, red	5	875
Shale, blue (New Providence)	303	1178
DEVONIAN SYSTEM.		
Shale, brown (Chattanooga)	125	1303
Shale, white (Chattanooga)	15	1318
Shale, brown (Chattanooga)	12	1330
Limestone (cap)	5	1335
Limestone (Corniferous)	25	1360
Total depth		1360

Note: The log of the J. H. Clark No. 2 well was similar to No. 1. The J. H. Clark No. 2 produced 1,100,000 cubic feet of natural gas from the Corniferous "sand." The Rawlston No. 1 drilled in 1902 to a total depth of 1267 feet produced 3,800,000 cubic feet of natural gas from the "Big Injun" sand. Authority: Charles R. Dulin, St. Petersburg, Florida.

WELL LOG No. 11.

James Hignite, No. 1. Lessor. Coleman Benton, Lessee. Location: Little Bullskin Creek, 1¾ miles east of Oneida, Clay County, Ky. Commenced: May 15, 1925. Completed: July 9, 1925. Production gas estimated 150 thousand and oil show. Drilled by H. O. Randel, contractor. C. H. E. 790 A. T. Plugged and abandoned.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil, sand, gravel	9	9
Limestone, gray (Wooden conductor, 12 ft.)	1	10
Shale, blue	14	24
Coal, black	1	25
Shale, blue	40	65
Sandstone, brown	124	189
Shale, blue	4	193
Sandstone, gray	119	312
Coal	1	313
Sandstone, gray (10" casing 424 ft.)	122	435
Coal	3	438
Sandstone, gray	27	465
Limestone, black	5	470
Sandstone, brown	35	505
Shale, blue	15	520
Limestone, gray	5	525
Shale, blue	20	545
Sandstone, gray	20	565
MISSISSIPPIAN SYSTEM		
Shale (Red Rock)	40	605
Shale, blue	55	660
Shale (Red Rock)	15	675
Limestone, gray	25	700
Shale, blue (8" casing 826 ft.)	27	727
Limestone, gray	53	780
Shale, blue	15	795
Limestone, gray	250	1045
Sandstone, gray (Show of oil 1,055 to 1,060.)	15	1060
Shale, green, blue	270	1330



AN OLD MOUNTAIN HOME

This old weather-boarded double log cabin with its closed-in porch and exterior stone chimneys is reminiscent of a day that is passing in Kentucky. With their low paling fences, old homes such as this one, which is located near Folger, breathe a flavor of the old Virginia plantations from whence their builders came.

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Shale, brown (Gas in shale, 1,400 to 1,410)	185	1515
Shale "Fire Clay," gray	10	1525
Shale, black	16	1541
Limestone "Irvine Sand," gray (Gas in sand 1,580 to 1,585.)	85	1625
Total depth		1626

All sands above lime carried more or less water. Corniferous was nearly all lime and very hard excepting between 1,580 and 1,585 feet it was of a sandy nature, and carried a small amount of gas.

WELL LOG No. 12.

Lizzie Sharp No. 1, lessor. Standard Oil Co. of Kentucky, lessee. Location: Near mouth of Big Wild Cat Creek on Goose Creek, about 9 miles from Manchester and 4 miles from Oneida, Ky. Production: Small gasser, plugged and abandoned. Drilled by H. O. Randel, contractor. Completed: June, 1925.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	10	10
Sand, loose, brown, soft (H. F. W.)	10	20
Mud, blue soft (67' 4" 10" Cas.)	47	67

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, hard white	83	150
Shale, blue	60	210
Sandstone, white	94	304
Shale, black	6	310
Sandstone, white	121	431
Shale, black	24	455
Limestone, black	10	465
Sandstone, white (Salt water)	105	570
Shale, black	5	575
MISSISSIPPIAN SYSTEM		
Limestone, black (Some gas.)	45	620
Shale, red	50	670
Shale, blue	50	720
Limestone, "Little Lime"	20	740
Shale, blue	48	788
Limestone, gray, "Big Lime" (798′ 8″ Cas.)	222	1010
Shale, green (S. L. M.)	25	1035
Shale, red	55	1090
Shale, blue and green	222	1312
DEVONIAN SYSTEM		
Shale, brown	148	1460
Shale, gray	37	1497
Limestone, sandy, gray (Irvine Sand)	81	1578
Shale, blue	21	1599
Total depth		1599

Note: Small gas in Big Lime from 1,000′ to 1,010′. Estimated fifteen thousand feet. Small gas in Irvine Sand from 1,537 to 1,542′. Estimated total gas in well 20 thousand cu. ft. Authority: J. C. Hall, Standard Oil Co., Louisville, Ky.

WELL LOG No. 13.

Elisha Gabbard No. 1, lessor. National Refining Co., lessee. Location: Mouth of Bar Creek on the waters of Red Bird Creek, Clay County, Ky. Commenced: July, 1925. Completed: Sept. 25, 1925. Production: Natural gas, about 500,000 cu. ft., open flow. Rock pressure 300 lbs. Contractor: H. O. Randel.

Strata	Thickness	Depth
RECENT		
Soil, yellow	12	12
PENNSYLVANIAN SYSTEM		
Sandstone, gray	20	32
Shale, blue	93	125
Coal, black	2	127

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, blue	48	175
Sandstone, gray	115	290
Shale, blue	15	305
Sandstone, gray	216	521
Coal	2	523
Shale, blue	10	533
Sandstone, gray	127	660
MISSISSIPPIAN SYSTEM		
Limestone, blue	40	700
Shale, red	15	715
Limestone, blue	10	725
Shale, red	5	730
Limestone, blue	9	739
Shale, red	7	746
Limestone, black	12	758
Shale, red	4	762
Limestone, black	38	800
Shale, red	15	815
Limestone, black	22	837
Shale, blue	5	842
Limestone, black	47	895
Shale, blue	6	901
Limestone, gray	17	918
Shale, blue	5	923
Limestone, blue	272	1195
Shale, green	9	1204
Shale, red	61	1265
Shale, blue	172	1437
Limestone, gray	7	1444
Shale, gray	35	1479
DEVONIAN SYSTEM		
Shale, brown	154	1633
Shale, gray	5	1638
Shale, black	15	1653
Limestone, "Gas Sand," brown	10	1663
Limestone, "Gas Sand," gray	10	1673
Limestone, blue (cave at bottom)	44	1717
Total depth		1717

Note: 10″ casing 120′; 8¼″ casing, 530′; 6⅝″ casing, 945 ft. Note change in material, character, etc. of each formation.

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Manuscript written September, 1922.
Revised July, 1926.

VIII.

NEW OIL AND GAS POOLS OF OWSLEY COUNTY.

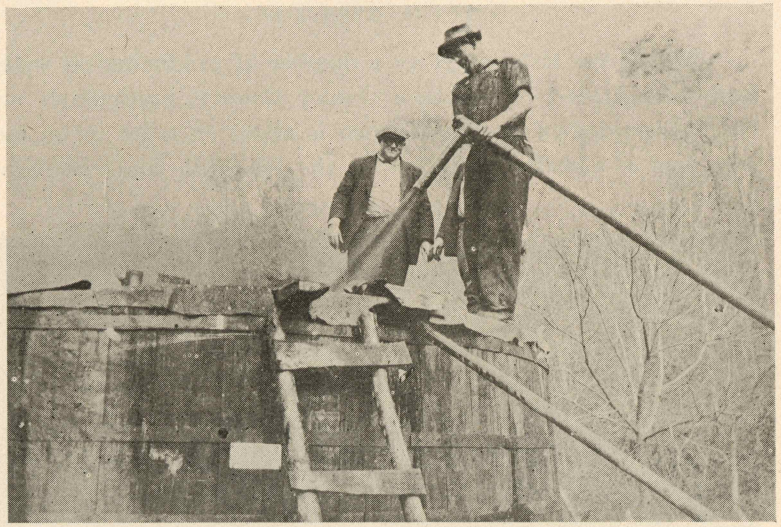
Buffalo Creek Pool.

Within the last two years a number of producing oil wells have been drilled in Southern Owsley County, particularly on the waters of Buffalo Creek which is about 15 miles in an air line west of Chavies, a station on the Louisville and Nashville

HENRY OIL CO. LEASE, WELLS NO. 1 AND NO. 4.

Railroad. The Buffalo Creek region is located in the western central part of the Eastern Kentucky Coal Field. The drainage is to the south fork of the Kentucky River, and is typically dendritic. The physical relief varies from 400 to 600 feet as shown on the Manchester topographic quadrangle. Entrenchment of the streams in this part of the Cumberland plateau is very pronounced. Only sandstones, shales and coals of Pottsville age (Lower Pennsylvanian) are found at the surface. These rocks have a subsurface thickness of about 850 to 900 feet in this vicinity, thereby giving a total upper Carboniferous section of

1,250 to 1,500 feet. They are underlaid by undisturbed limestones, sandstones and shales not less than 3,500 or 4,000 feet in thickness of Mississippian, Devonian, Silurian, and Ordovician age.



TANKING PRODUCTION HENRY OIL CO. NO. 1 WELL.

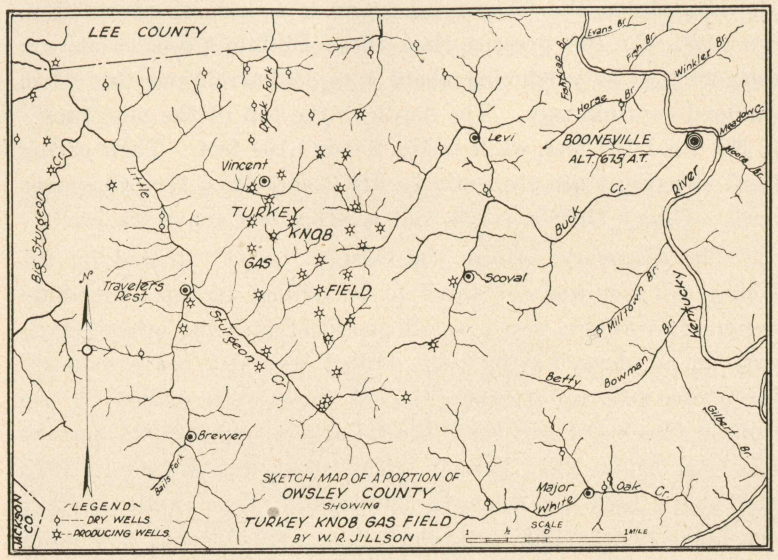
The first commercial oil production in the Buffalo Creek territory was brought in by the Henry Oil Co. which drilled in its first producer on September 19, 1924. This well produced when flush an estimated 20 to 25 barrels per day from the Gasper oolitic limestone (Chester) at a total depth of 1,111 feet. The samples of the "sand" from the oil producing horizon were examined under the microscope and identified by the writer. The oil production of this section, therefore, comes from the upper part of what is known to drillers as the "Big Lime" (Upper Mississippian).

This portion of Owsley County is the only section in Kentucky where commercial quantities of oil are now being produced from the Gasper limestone, though oil shows have been found in the Big Lime in Martin County whereas in the Williamsburg, Ky. field, it has long produced gas in large quantities. Near

Bowling Green the Gasper limestone is found oil-saturated in quarries. At the present time these Buffalo Creek wells are estimated to be producing about 8 to 10 barrels per day when pumped continuously. The depth to the top of the oil "sand" in No. 1 is 1,107 feet, while in No. 2 it is 1,104 feet. Their casing head elevations are respectively 818.0 and 815.5 feet above sea level. Henry Oil Co. No. 3 well is 816.9 feet above sea level.

The discovery well in the Gasper "sand" drilled by the Henry Oil Co. was the third to be drilled in this immediate region, two others, one a small producer and the other giving only an oil show, having been drilled several years previously ½ to one mile up stream. One of these wells drilled by the Buffalo Creek Oil and Gas Co. of Parkersburg in 1921 may be seen just below Billy Branch. The other was drilled in 1922 just above Lick Branch. In addition to these wells another dry hole (depth 1,320 feet) had been drilled about five miles below this group of drillings on the waters of Buffalo Creek just below the mouth of Roans Branch in 1918.

On January 25, 1925 the Henry Oil Co. commenced drilling No. 2 well and completed it as a commercial oil well March 11, 1925. This organization has recently brought in its No. 3 well which is also a producer of commercial importance. During the same period the Superior Oil Co., C. B. Gross, and the Standard Oil Co. of Kentucky have each drilled in wells at points within a mile to a mile and a half down stream. The first and last of these recent drillings were dry, while the Gross well cased and tubed shows a small amount of oil, and can be made a small commercial producer. Logs of these drillings together with the Henry Oil Co. logs and a few others scattered throughout Owsley County are presented herewith for comparative purposes.



WELL LOG No. 1.

OWSLEY COUNTY

Thos. Forman Co., No. 1, lessor. Henry Oil Co., No. 1, lessee. Location: Buffalo Creek, South Fork of Ky. River, just below Old House Creek, and near Mistletoe P. O., Owsley County, Ky. Commenced: May, 1924. Completed: Sept. 19, 1924. Production: Estimate of 20 bbls. from Big Lime. 1107-1111 feet in depth. C. H. E. 818.0 A. T.

Strata	Thickness	Depth
RECENT		
Creek sand and gravel	14	14
PENNSYLVANIAN SYSTEM		
Sandstone	12	26
Shale and coal	4	30
Shale	46	76
Sandstone	8	84
Sandstone and shale	46	130
Sandstone	25	155
Shale	20	175
Shale, sandy	38	213
Shale	25	238
Shale, sandy	15	253
Sandstone	12	265
Shale	25	290
Shale, sandy	10	300
Shale	25	325

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, hard	50	375
Shale and sand	10	385
Sandstone	55	440
Sandstone and shale	5	445
Shale	20	465
Shale, black	5	470
Sandstone, fine white	5	475
Shale and dark sand	10	485
Sandstone, fine, white	10	495
Shale, sandy and coarse white sandstone	10	505
Sandstone, white, medium coarse	42	547
Sandstone, light bluish micaceous	35	582
Sandstone, fine, ferruginous	20	602
Shale, dark blue to black	8	610
Sandstone, fine white	22	632
Sandstone, fine with streaks of shale	12	644
Sandstone, fine white	37	681
Sandstone, yellow and dark shale	5	686
Sandstone, fine brown	6	692
Sandstone, fine white	2	694
Shale, brown, sandy	5	699
Shale, light blue	39	738
Sandstone, fine white	9	747
Sandstone, yellow, brown ferruginous	8	755
Shale, light blue	5	760
Sandstone, coarse	5	765
Sandstone, fine white	45	810
Sandstone, fine brown "Salt Sand"	64	874
Shale, sandy, limey	58	932
Sandstone, fine brown	34	966
MISSISSIPPIAN SYSTEM		
Shale, light blue, limey	130	1096
Limestone, shaly brown	11	1107
Limestone, light brown, open textured (oil)	11	1118
Total depth		1118

Note:—Cased at 253 feet.

WELL LOG No. 2.

Thomas Forman Co., No. 2, lessor. Henry Oil Co., No. 2, lessee. Location: Upper Buffalo Creek, South Fork of Kentucky River, near Mistletoe P. O., Owsley County, Ky. Commenced: Jan. 15, 1925. Completed: Mar. 11th, 1925. Production: First 24 hours after shot 42.8 bbls. by gauge. C. H. E. 815.5 A. T.

Strata	Thickness	Depth
RECENT		
Creek sand and gravel	11	11
PENNSYLVANIAN SYSTEM		
Sandstone	14	25
Shale	50	75
Sandstone	75	150
Shale	20	170
Shale, sandy	35	205
Shale—cased 8¼" casing at 233	40	245
Sandstone	15	260
Shale—water and gas at 320—hole full of water	60	320
Shale	60	380
Sandstone	55	435
Shale	35	470
Sandstone, white	130	600
Shale	10	610
Sandstone	80	690
Shale, sandy	45	735
Sandstone, white	20	755
Shale	30	785
Sandstone	55	840
Shale, sandy	5	845
Shale, black	34	879
Shale, muddy	11	890
Shale	28	918
Sandstone, white "Salt Sand"	35	953
Shale, blue—cased at 956 6⅝" casing	3	956
Shale	9	965
MISSISSIPPIAN SYSTEM		
Shale, limey	15	980
Shale	85	1065
Limestone, black	24	1089
Limestone, sandy, brown, hard, cap, Gasper limestone	11	1100
Limestone, brown, sandy, pay sand, Gasper limestone	15	1115
Oil filled over tools at 1102.		
Total depth		1115

Shot 40 quarts 2-4 in. shells.

WELL LOG No. 3.

Thomas Forman Co., No. 3, lessor. Henry Oil Co., lessee. Location: Upper Buffalo Creek, near Mistletoe P. O., Owsley County, Ky. Commenced: May 1, 1925. Completed: June 20th, 1925. Authority: Frank Henry.

Strata	Thickness	Depth
RECENT		
Creek sand and gravel	15	15
PENNSYLVANIAN SYSTEM		
Sandstone, hard	15	30
Shale	50	80
Sandstone	75	155
Shale	20	175
Shale, sandy	35	210
Shale	40	250
Sandstone	15	265
Shale, water and gas	55	320
Shale	65	385
Sandstone	55	440
Shale	35	475
Sandstone	130	605
Shale	10	615
Sandstone	85	700
Shale, sandy	40	740
Sandstone, white	20	760
Shale	30	790
Sandstone	55	845
Shale, sandy	5	850
Shale, black	35	885
Shale, soft	10	895
Shale	25	920
Sandstone, white	20	940
Sandstone, white "Salt Sand"	20	960
Shale	2	962
Shale	23	985
MISSISSIPPIAN SYSTEM		
Shale, limey	65	1050
Shale, blue, cavey	16	1066
Limestone, black	29	1095
Limestone, brown, sandy—Cap	9	1104
Limestone, brown, sandy, best pay	14	1118
Limestone, brown, sandy	13	1131
Limestone, brown sandy	25	1156
Total depth		1156

Note:—8¼ casing at 233 feet. 6¼ casing at 962 feet.
Shot 40 qts. 2-4″ shells. 1102-1118. 13 ft. anchor.
Drilled 28 feet under shot to make pocket for shale caving from 1060 feet.

WELL LOG No. 4.

Hogg heirs, No. 1, lessors. Standard Oil Co., lessee. Location: Head of Harrison Branch, Upper Buffalo Creek, Owsley County, Kentucky. Commenced: Oct. 12, 1925. Completed: Dec. 18, 1925. C. H. E. 1241.0 A. T.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Clay, soft yellow	10	10
Sandstone, brown	15	25
Shale, gray	35	60
Shale, sandy blue gray	20	80
Shale, black	20	100
Sandstone, brown to medium black	25	125
Shale, soft blue	15	140
Coal, soft black	2	142
Shale, blue, soft	45	187
Shale, sandy soft blue	25	212
Shale, blue and black	50	262
Coal, black, soft	2	264
Sandstone, soft, white	57	321
Sandstone, hard, white	16	337
Shale, gray, shelly	59	396
Coal, soft black	2	398
Shale, sandy, blue, hard	82	480
Sandstone, brown, hard	30	510
Shale, black, hard	30	540
Limestone, black, hard	20	560
Sandstone, white, hard	14	574
Shale, black, hard	10	584
Sandstone, hard, white	53	637
Shale, hard, black	18	655
Limestone, hard, black	30	685
Shale, soft, black	85	770
Limestone, black, hard 250 ft., water 772	20	790
Shale, soft blue	40	830
Sandstone, hard white	130	960
Limestone, sandy, brown to black	13	973
Coal, soft black	2	975
Sandstone, white, hard	70	1045
Shale, black, soft	2	1047
Limestone, sandy black, hard	23	1070

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone, hard white	88	1158
Shale and blue mud, soft	5	1163
Limestone, black, hard	15	1178
Shale, sandy, hard, black	22	1200
Sandstone, white, very hard	124	1324
Shale, soft blue (mud)	1	1325
Sandstone, settling, black, very hard	4	1329
MISSISSIPPIAN SYSTEM		
Limestone, black, hard	12	1341
Shale, soft, black, sandy	35	1376
Limestone, sandy, gray-brown, hard	32	1408
Sandstone, white, very hard	16	1424
Shale, sandy, blue, soft	11	1435
Sandstone, "salt," white, 600 ft. salt water	15	1450
Shale, sandy, black, med.—cased 6⅝, 24 lb.	17	1467
Shale, sandy, blue, soft, casing at 1457	71	1538
Limestone, black, hard	29	1567
Limestone, gray, hard	15	1582
Limestone, brown, hard	8	1590

Continuation of above well commenced Jan. 1, 1926, completed Jan., 18.

Limestone, sandy, brown, hard	32	1622
Limestone, white, hard	8	1630
Limestone, dark brown, hard	4	1634
Limestone, hard, brown	60	1694
Limestone, sandy, brown, hard	5	1699
Limestone, hard, brown	19	1718
Limestone, hard, light brown	10	1728
Limestone, sandy, brown,, hard	9	1737
Limestone, sandy, dark brown, hard	8	1745
Limestone, sandy, light brown, very hard	15	1760
Limestone, sandy, light brown, very hard	8	1768
Limestone, sandy, dark brown, very hard	7	1775
Limestone, gray, very hard	4	1779
Limestone, sandy, dark gray, very hard	4	1783
Limestone, shaley, dark gray, hard	4	1787
Limestone, sandy, light brown, soft, "pay sand"	5	1792
Shale, light blue?, soft	19	1811
Shale, dark blue, soft	4	1815
Total depth		1815

Well shot 20 qts. of glycerine between 1787-1795. Did not improve the showing.

Well was plugged Jan. 18, 1926.

Note:—This well would have made 4-5 bbls. in the "sand" 1787-1792.

WELL LOG No. 5.

Dean-Forman No. 1, lessor. Rex-Pyramid Oil Co., lessee. Location: Near mouth on waters of Old House Branch of Upper Buffalo Creek, Owsley, County, Ky. Commenced: Feb. 8, 1926. Completed: Mar. 20, 1926. Contractor: Frank Henry. C. H. E. 851.0 A. T.

Strata	Thickness	Depth
RECENT		
Soil	4	4
PENNSYLVANIAN SYSTEM		
Shale, sandy	14	18
Coal	1	19
Shale, sandy	41	60
Sandstone, white	12	72
Shale	18	90
Limestone, sandy	7	97
Shale, black	56	153
Sandstone, white	13	166
Shale, black	47	213
Sandstone, gray	20	233
Shale, black	36	269
Shale, black	42	311
Limestone, black	63	374
Shale, sandy	25	399
Shale, black	40	439
Shale, sandy	33	472
Sandstone, white	75	547
Shale, blue	3	550
Sandstone, blue	15	565
Sandstone, white	80	645
Coal	2	647
Sandstone, white	45	692
Coal	2	694
Limestone, black	9	703
Sandstone, brown, hard	75	778
Sandstone, white	15	793
Sandstone, white	68	861
Shale, blue	5	866
Limestone, black	18	884
Shale, "Red Rock," and soft	5	889
Shale	10	899

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Limestone, black	30	929
Limestone, shaley	4	933
Shale, green	5	938
Shale, brown	5	943
Sandstone, white "Salt Sand"	34	977
Shale, blue	10	987
Sandstone	5	992
Sandstone and shale	6	998
Shale, black	2	1000
Shale, black	11	1011
Shale, blue	30	1041
MISSISSIPPIAN SYSTEM		
Limestone, sandy	5	1046
Shale, blue, limey	30	1076
Limestone, black	34	1110
Limestone, brown, sandy "Cap"	12	1122
Limestone, brown, sandy, oil show	5	1127
Limestone, light brown	21	1148
Limestone, dark brown	13	1161
Total depth		1161

Note:—8¼" casing at 269 feet. 6⅝" casing at 998 feet. Show of gas at 495 feet. Show of oil 1122-1127 feet. Hole full of water at 793 feet.

WELL LOG No. 6.

Walter Gibson, No. 1, lessor. Eastern Gulf Oil Co., Lexington, Ky., lessee. Location: On waters of Bear Run of Cow Creek, Owsley County, Ky. Commenced: May 26, 1924. Completed: June 18, 1924. Contractor: C. E. Dearolph.

Strata	Thickness	Depth
RECENT		
Soil	5	5
PENNSYLVANIAN SYSTEM		
Shale	10	15
Shale, shelly, water	20	35
Coal	2	37
Limestone	3	40
Shale	20	60
Limestone, broken	90	150
Limestone, hard	5	155
Limestone, broken	55	210
Sandstone	60	270
Shale	50	320

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Limestone, white	20	340
Limestone and shale, broken	10	350
Sandstone, sharp	205	555
Shale, black	65	620
MISSISSIPPIAN SYSTEM		
Limestone—casing point, 6¼ in.	5	625
Shale, black	35	660
Limestone, "Big Lime," hard	140	800
Shale and shells	90	890
Shale, red	20	910
Shale	310	1220
DEVONIAN SYSTEM		
Shale, brown "Chattanooga"	190	1410
Shale, "Fire Clay"	2	1412
Shale	18	1430
Limestone, brown "sand" Cornif. light show of oil	11	1441
Limestone, brown, "sand"	8	1448
Limestone, "Corniferous"	64	1512
Limestone, "Sand," "Corniferous	3	1515
Total depth		1515

Show of oil, salt water 250 ft., filled up 500 feet. 30 minutes—filled up 1,250 ft. 2 hours. Plugged and abandoned. 8¼" casing 20 feet. 6¼" casing 625 feet.

WELL LOG No. 7.

Burns-Forman, No. 1, lessors. C. B. Gross, et al., lessees. Location: Buffalo Creek, near Henry Wells, Owsley County, Ky. Commenced: June 22, 1925. Completed: Oct. 31, 1925. C. H. E. 879.0 A. T.

Strata	Thickness	Depth
RECENT		
Surface soil	28	28
PENNSYLVANIAN SYSTEM		
Sandstone	38	66
Coal	4	70
Shale, blue	34	104
Sandstone, shelly	12	116
Shale, white, limey	57	173
Sandstone	10	183
Shale, white	20	203
Sandstone	21	224
Shale, blue	40	264
Sandstone	10	274

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, blue	46	320
Sandstone	25	345
Shale, blue—cased 8¼—400 ft.	66	411
Shale, white	129	540
Sandstone	20	560
Shale, blue	30	590
Sandstone, "Mountain Sand"	60	650
Shale, blue	20	670
Sandstone, "Salt sand"	85	755
Shale, black	35	790
Sandstone, "Salt sand"	125	915
MISSISSIPPIAN SYSTEM		
Limestone, sandy	10	925
Shale, blue	25	950
Limestone, black	40	990
Limestone, white, sandy	30	1020
Limestone, white, sandy, with water	15	1035
Shale, limey	15	1050
Limestone, hard	18	1068
Shale, blue	12	1080
Limestone, black	5	1085
Limestone, broken	35	1120
Shale, black, "Pencil Cave," cased 1127½	7	1127
Limestone, black—Cap of "Big Lime"	25½	1152½
Limestone, "Big Lime"—1st pay oil	15½	1168
Limestone,—pay sand	7	1175
Limestone, gray—top of 2nd pay sand	15	1190
Limestone, gray—2nd pay sand	9	1199
Limestone, gray and shale	3	1202
Total depth		1202

WELL LOG No. 8.

Location: Below Roans Branch of Buffalo Creek, near Clay-Owsley County line. One-half mile from Creek on North Side. Completed in 1918.

Strata	Thickness	Depth
RECENT.		
Clay	5	5
PENNSYLVANIAN SYSTEM		
Shale	21	26
Sandstone	44	70
Shale	30	100
Shale, shelly	110	210

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone	240	450
Shale	25	475
MISSISSIPPIAN SYSTEM.		
Limestone, "Little Lime"	15	490
Shale	10	500
Limestone, "Big Lime"	120	620
Shale	10	630
Limestone	25	655
Sandstone	15	670
Shale, white, shelly	170	840
Shale, dark, shelly	280	1120
DEVONIAN SYSTEM		
Shale, black } "Chattanooga"	163	1283
Shale, white } "Chattanooga"	3	1286
Shale, brown } "Chattanooga"	23	1309
Limestone	8	1317
Limestone "Sand"	3	1320
Total depth		1320

Note: Oil pay was struck at 1,317 feet in depth. This record revised from p. 471 Oil and Gas Resources of Kentucky. Ky. Geol. Survey, Bull. 1, Ser. V, 1920.

WELL LOG No. 9.

Brandenberg, lessor. Petroleum Exploration, Lessee. Location: On waters of Wild Dog Creek, about ½ mile west of the mouth of Wild Dog Creek, Owsley Co., Ky. Drilled by Hupp, Heidrick, et al. Commenced: 1923. Completed: 1923.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sandstone	800	800
Sandstone, "gas sand"	12	812
Limestone, blue--oil show, water	28	840
Total depth		840

Filled back and led plug set to shut off salt water.

This well had some big hole gas above the limestone which still show up outside the casing.

It is said that this well tested about 1,000,000 cu. ft.

The Rex Oil Co. have a gas well about two miles south of this well on the Joe Tackett farm; also two wells on the Venable farm, about two miles southeast. The Venable wells tested around 2,000,000 cu. ft. each, while the Tackett well only showed about 150,000 feet.

WELL LOG No. 10.

J. B. Gathright Land Co., lessor. D. L. Johnson, lessee. Location: On waters of Sturgeon Creek, Owsley County, Ky. Commenced: Completed: July 8th, 1925.

Strata	Thickness	Depth
RECENT		
Soil	10	10
PENNSYLVANIAN SYSTEM		
Sandstone, black shale	379	389
Limestone, "Big Lime"	120	509
Shale, green, hard, sandy	71	580
Shale, "Soapstone"	364	944
Shale, black, "Chattanooga"	126	1070
Shale, "Fire Clay"	12	1082
Shale, coffee, "Sunbury"	8	1090
Limestone, white, hard, "Cap"	7	1097
Sandstone, "Gas Sand," very open	8	1105
Total depth		1105

Open flow tested at 1097, 1,861,000 cu. ft. Open flow tested at 1105, 2,151,080 cu. ft. Rock pressure 325 lbs. 407 feet, 6⅝ 17 lbs. casing.

Tubing Record:—6⅝ special type oil well packer. 18 in. rubber set at 1090. Gas cage set at 1102. Anchor 3 feet below cage. 1800 test line pipe used for tubing, new. 2″ Darlington high pressure gate valve. 300 feet of water run outside of tubing, shut off completely.

Drillers:—Chas. Morgan and Chas. Hanlin. Tool dressers: Everett Morgan and Hayden Arthur.

LOG WELL No. 11.

J. S. Burns, No. 1, lessor. Superior Oil Corporation, lessee. Location: 150′ N. E. of Creek, 150′ from S. line of J. S. Burns which is N. line of Morris farm, Owsley County, Ky. Commenced: July 30, 1925. Completed: Jan. 5, 1926.

Strata	Thickness	Depth
RECENT		
Soil	20	20
PENNSYLVANIAN SYSTEM		
Shale, sandy	25	45
Sandstone, white	15	60
Coal	5	65
Limestone, gray	20	85
Coal	3	88
Shale, sandy	17	105
Sandstone, white	35	140
Shale, blue	15	155
Shale, hard, sandy	125	280

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, black	30	310
Shale, hard, sandy	70	380
Shale, shelly—set 445′ 8″ pipe	65	445
Sandstone, white	65	510
Shale, blue	75	585
Shale, sandy	110	695
Shale, blue	5	700
Sandstone, white	129	829
Shale, green	2	831
Shale, sandy	14	845
Shale, blue	15	860
Shale, sandy	60	920
Shale, blue	20	940
Shale, black, very hard	3	943
MISSISSIPPIAN SYSTEM		
Shale, blue	17	960
Limestone, dark	10	970
Limestone, shelly	45	1015
Shale, dark	15	1030
Limestone, black, set 1044′, 6¼ casing	28	1058
Sandstone, light—"pay sand"	9	1074
Sandstone, dark—show of oil		
Sandstone, light	12	1086
Sandstone, dark	23	1109
Shale	5	1114
Sandstone, light	16	1130
Shale	4	1134
Limestone, dark	9	1143
Limestone, white	7	1150
Limestone, dark	8	1158
Limestone, dark	82	1240
Shale, blue, "New Providence"	350	1590
DEVONIAN SYSTEM		
Shale, black } "Chattanooga"	211	1801
Shale, green } "Chattanooga"	10	1811
Shale, black } "Chattanooga"	6	1817
Limestone, dark gray } "Corniferous"	11	1828
Limestone, white } "Corniferous"	1	1829
Limestone, black } "Corniferous"	7	1836
Limestone, gray } "Corniferous"	12	1848
Limestone, black } "Corniferous"	15	1863
Limestone, gray } "Corniferous"	3	1866
SILURIAN SYSTEM		
Limestone, black	34	1900

Strata	Thickness	Depth
SILURIAN SYSTEM		
Limestone, gray	35	1935
Shale, green	7	1942
Total depth		1942

WELL LOG No. 12.

T. W. Cooper, No. 1, lessor. Eastern Gulf Co., lessee. Location: 1,000 feet N. E. of school house at mouth of Moore Fork and Tinney Fork of Lower Buffalo Creek and 1,500 feet E. of county road. Commenced: July 1, 1918. Completed: Aug. 21, 1918. Production: Small oil and gas shows, plugged and abandoned. Armes Drilling Co., contractors.

Strata	Thickness	Depth
RECENT		
Soil	5	5
PENNSYLVANIAN SYSTEM		
Shale	13	18
Coal	1½	19½
Shale, shelly	70½	90
Coal	4	94
Shale, shelly	116	210
Sandstone, gas, water	15	225
Sandstone	75	300
Shale, break	10	310
Sandstone, shelly	70	380
Shale	20	400
MISSISSIPPIAN SYSTEM		
Shale, shelly	90	490
Limestone, "Big Lime"	10	500
Limestone, "Big Lime"	155	655
Shale	20	675
Shale, shelly	70	745
Shale, shelly	60	805
Shale, "Red Rock"	5	810
Shale, shelly	80	890
Shale, black	30	920
Shale, shelly	180	1100
Shale	2	1102
DEVONIAN SYSTEM		
Shale, brown } "Chattanooga"	33	1135
Shale, white } "Chattanooga"	167	1302
Shale, black } "Chattanooga"	26	1328
Limestone, "Top oil sand"		1328
Limestone "Salt water"	10	1338

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone	10	1348
Limestone	10	1358
Limestone, white	10	1368
Limestone, brown	10	1378
Limestone, dark brown	10	1388
Limestone, gray	35½	1423½
Total depth		1423½

Note:—Last casing was set at 1358, and upper casing as follows: 8¼ casing 47 feet out. 6¼ casing 500 feet out. 4⅞ casing 1349 feet out. Oil at 1330 feet.

This record revised from pp. 471-472 of "Oil and Gas Resources of Ky.," Bul. 1, Series 5, Ky. Geol. Survey, 1920.

WELL LOG No. 13.

Chester Gourlay, lessor. Petroleum Exploration, lessee. Location: On waters of Sturgeon Creek ½ mile east of the mouth of Wild Dog Creek, on top of hill. Commenced: ————. Completed: May 16, 1924. Drilled and owned by the Petroleum Exploration of Sistersville, W. Va.

Strata	Thickness	Depth
PENNSYLVAIAN SYSTEM		
Soil	12	12
Shale, sandstone, shells	328	440
MISSISSIPPIAN SYSTEM		
Limestone, "Big Lime"	130	570
Shale, blue, soapstone	454	1024
DEVONIAN SYSTEM		
Shale, black, "Chattanooga"	120	1144
Shale, "Fire Clay"	6	1150
Shale, dark	4	1154
Sandstone	6	1160
Sandstone, "gas sand"	12	1172
Limestone, blue	12	1184
Total depth		1184

Gas tested after completion 1,300,000 cu. ft. Rock pressure 240 lbs. 570 feet 6⅝ casing.

WELL LOG No. 14.

S. W. Maupin, No. 1, lessor. ————, lessee. Location: Doe Creek, 4 miles S. W. of Booneville, Owsley County, Ky. Authority: O. L. Knight, through C. H. Hopping.

Strata	Thickness	Depth
RECENT		
Soil, 10 in. casing	10	10
PENNSYLVANIAN SYSTEM		
Shale	335	345
Sandstone	315	660
MISSISSIPPIAN SYSTEM		
Limestone, "Little Lime"	10	670
Shale	30	700
Limestone "Big Lime"	118	818
Sandstone, "Big Injun," oil 860-866	82	900
Total depth		900

Note:—Set 8¼ casing 123 feet. Set 6¼ casing 693 feet.

WELL LOG No. 15.

Bowen Pendergrass, Well No. 1, lessor. Davis Oil Co., lessee. Location: Waters of White Oak Creek, of south fork of Kentucky River, near Major P. O., 4½ miles south of Booneville, Owsley County, Ky. Commenced: ————. Completed: ————.

Strata	Thickness	Depth
RECENT		
Soil	20	20
PENNSYLVANIAN SYSTEM		
Shale and shells	60	80
Shale, soft caving	10	90
Sandstone	110	200
Shale	190	390
Shale	35	425
Sandstone	35	460
Shale, white	15	475
MISSISSIPPIAN SYSTEM		
Shale, "Pencil Cave"	15	490
Limestone, "Big Lime"	180	670
Total depth		670

Note:—Gas was found in the "Big "Lime" at 535 feet. Show of gas 625-630 ft; oil and gas 660-662; 662-664 is reported to have shown oolites and may have been the Cooper limestone (Chester) but this seems hardly probable as it is apparently too low in the limestone series.

WELL LOG No. 16.

Well drilled for oil and gas. Location: 2½ miles N. W. of Booneville, Owsley County. Commenced: ————. Completed: ———— Production: Reputed to be 35 bbls. oil.

Strata	Thickness	Depth
RECENT		
Soil	5	5
PENNSYLVANIAN SYSTEM		
Sandstone, hard, gray	7	12
Shale and shells	5	17
Coal	3	20
Shale, gray	35	55
Coal	2	57
Shale, blue	43	100
Coal and gas	3	103
Shale, blue	37	140
Sandstone	10	150
Shale, blue	8	158
Coal	4	164
Sandstone, white	25	187
Shale, black	28	215
Sandstone, white	40	255
Sandstone, gray, white	40	295
Shale, black, water	10	305
Sandstone, gray	20	325
Sandstone, white	120	445
Shale, "Fire Clay"	5	450
Shale, gray	15	465
MISSISSIPPIAN SYSTEM		
Limestone, gray, "Little Lime"	34	499
Shale, dark	13	502
Limestone, "Big Lime"	130	632
Shale, green	12	644
Shale, "Red Rock"	22	666
Shale, green	9	675
Shale, "Red Rock"	72	747
Shale, green	35	782
Limestone, shelly	17	799
Shale, gray	306	1105
DEVONIAN SYSTEM		
Shale, brown, "Chattanooga"	146	1251
Shale, soft, "Fire Clay"	18	1260
Shale, brown	5	1274
Limestone, "pay sand" } "Corniferous" }	7	1290
Limestone } "Corniferous" }	9	1283
Limestone	11	1301
Total depth		1301

Note:—Set casing at 474 feet.

LOG No. 17.

John G. White Oil & Gas Co., No. 1. Location: On Meadow Creek. Commenced: Feb. 10, 1909. Completed: April 12, 1909. Production: Dry hole. Authority: C. E. Bales.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Soil	8	8
Shale	60	68
Sandstone	32	100
Shale, blue	100	200
Sandstone	175	375
Shale, blue	50	425
Sandstone (salt water)	193	618
Shale	6	624
MISSISSIPPIAN SYSTEM		
Limestone (Little Lime)	8	632
Shale, blue	20	652
Limestone (Big Lime)	184	836
Shale (Waverly)	438	1274
DEVONIAN SYSTEM		
Shale, brown (Chattanooga)	173	1447
Shale (fire clay)	15	1462
Shale, brown	10	1472
Limestone (Corniferous)	31	1503
Total depth		1503

WELL LOG No. 18.

Rufus Barker, No. 1, lessor. Location: At Traveler's Rest P. O. Production: No oil, gas under cap.

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Sand (Mountain)	469	469
MISSISSIPPIAN SYSTEM		
Limestone (Big Lime)	101	570
Limestone, white	14	584
Shale, green (Waverly)	398	982
DEVONIAN SYSTEM		
Shale, blue, Chattanooga	130	1112
Shale, black, Chattanooga	16	1128
Fire clay	4	1132
Limestone "sand," (gas)	20	1152
Shale, black	15	1167

Strata	Thickness	Depth
DEVONIAN SYSTEM		
Limestone "sand"	34	1201
Shale, blue	1	1202
Total depth		1202

Casing record: 32 ft. 8¼ in. casing; 584 ft. 6¼ in. casing.

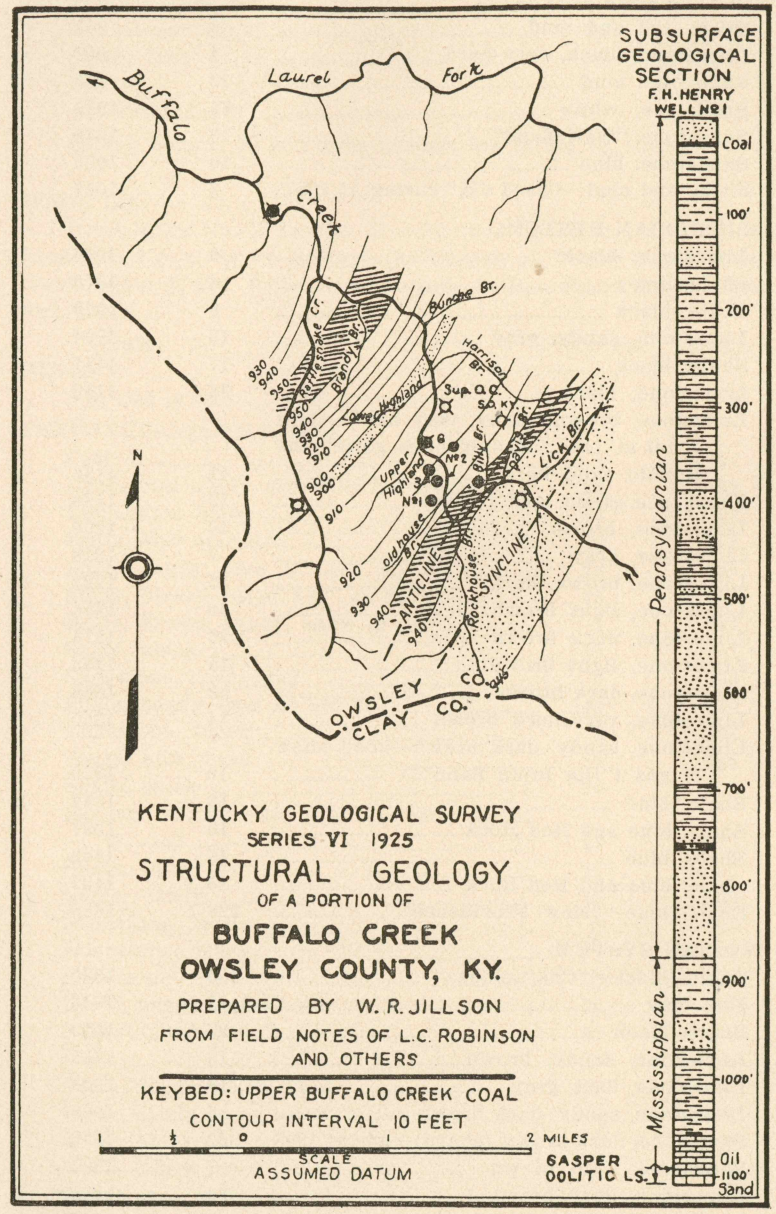
WELL LOG No. 19.

Dean Heirs No. 1, Lessor. Rex-Pyramid and Henry Co., Lessees. Location: 1½ miles up Rattlesnake Branch of Upper Buffalo Creek, Owsley County, Ky. Incompleted record. Driller, Frank Henry, Frankfort, Ky.

Strata	Thickness	Depth
RECENT		
Soil and gravel	9	9
PENNSYLVANIAN SYSTEM		
Coal	1	10
Limestone, sandy, gray-hole full fresh water	22	32
Limestone, black	55	87
Shale, blue and mud	78	165
Shale, sandy, blue	30	195
Shale, black—cased 8¼" at 205'	35	230
Shale, brown, sandy, show of gas	1	231
Shale, black	10	241
Sandstone, hard, gray	9	250
Shale, sandy—gas at 380 ft.	140	390
Limestone, black	8	398
Shale, blue, hard	87	485
Shale, black	20	505
Sandstone, gray—250 ft. fresh water at 510 ft.	17	522
Shale, light blue	23	545
Shale, sandy	15	560
Sandstone, hard	8	568
Limestone, black	7	575
Sandstone	35	610
Shale, sandy, black	52	662
Sandstone, white	87	749
Coal	1	750
Shale, sandy, black, hard	27	777
Shale, sandy, gray, hard	6	783
Shale, black and mud	5	788
Shale, black, hard	15	803
Sandstone, white, hard	134	937
Shale	10	947
Limestone, broken	10	957

Strata	Thickness	Depth
PENNSYLVANIAN SYSTEM		
Shale, red and mud	6	963
Limestone, black, very hard	4	967
Shale, and mud	13	980
Sandstone, white	55	1035
Sandstone, "Salt Sand"	10	1045
Sandstone, blue	10	1055
Shale, and mud—Cased 6⅝" casing at 1057'	2	1057
MISSISSIPPIAN SYSTEM		
Limestone, black	9	1066
Shale, limey	4	1070
Shale, black	9	1079
Limestone, sandy, gray	15	1094
Shale, black	17	1111
Limestone, black	34	1145
Limestone, brown, sandy, very hard—show of oil at 1160. Should have gotten the Buffalo sand here	41	1186
Shale, pea green, and pyrites	10	1196
Limestone, brown	10	1206
Limestone, gray	7	1213
Limestone, brown, dark	15	1228
Limestone, light brown	30	1258
Limestone, dark brown	20	1278
Limestone, light brown	15	1293
Limestone, dark brown	53	1346
Limestone, very dark brown	14	1360
Limestone, sandy, dark brown—good show of gas ("Big Injun Sand"?)	10	1370
Shale, blue	12	1382
Shale, blue and Red Rock	15	1397
Shale, blue	45	1442
Shale, blue and Red Rock	15	1457
Shale, blue—"New Providence"	228	1685
DEVONIAN SYSTEM		
Shale, black—"Chattanooga"	150	1835
Fire clay	8	1843
Shale, black	27	1870
Limestone, sandy, brown	15	1885
Limestone, dark gray	18	1903
Limestone, sandy, dark brown	5	1908
Sandstone, dark brown (sharp)—gas at 1908	22	1930
Sandstone, light brown	7	1937
Limestone, dark brown	23	1960
Limestone, sandy, gray	2	1962

Still drilling Nov. 15, 1926.



SKETCH MAP OF BUFFALO CREEK POOL STRUCTURE.

Structural Geology

The structural geology of Owsley County as a unit has not been mapped, but enough information is available from the detailed structural maps of Perry, Breathitt and Leslie counties which adjoin Owsley County on the East to indicate beyond doubt that the county occupies a low regional position on the Eastern flank of the Cincinnati arch. It is a distinct probability that the southern tip of Owsley County actually reaches down to within about a mile of the axis of the Eastern Kentucky Geosyncline as mapped on the surface coals in Western Perry County from the vicinity of Buckhorn south and slightly west of the Middle Fork of the Kentucky River.

This great syncline passes southeastward out of Perry County over the headwaters of Leatherwood Creek into Clay County near Burger Knob (1,750 feet)—the ridge point where Clay, Leslie and Perry corner. A study of the well logs in adjoining portions of Clay, Owsley and Perry counties indicates that the mediumly deep subsurface structure of the Buffalo Creek region is probably nearly monoclinal. The uninterrupted dip of deep strata to the southeast is brought about by the progressive thickening in this direction of the subsurface coal measures, principally the sandstones and shales, members of the Lee formation.

As interpreted from elevations placed by plane table methods on surface coals, chiefly that coal known locally as the upper Buffalo Creek seam, the structure in the immediate vicinity of the productive Henry wells is a low figuring anticlinal terrace. the reversal dip to the northwest being about 40 feet. Imediately southeast or upstream from these wells a low and broad syncline interrupts the rise of the surface measures to the Southeast. The dry well at the mouth of Lick Branch is located near the middle of this syncline, while the well which produced a small oil show near the mouth of Billy Branch is on the Southeast flank of the low anticline previously referenced. The productive Henry wells are located on the Northwest flank of this small structure.

The three wells drilled recently by C. B. Gross near the mouth of Upper Highland Creek, by the Superior Oil Corporation about ¾ of a mile below it on Main Buffalo Creek, and

the Standard Oil Company of Kentucky on the head of Harrison Branch are all down structure from the Henry wells. The Gross and Superior wells are in fact not far above a local syncline which crosses lower Highland Creek and Buffalo Creek just below Harrison's Branch. The dry well just below Roans Branch is located about 2½ miles down stream from the point where this local syncline crosses. It is considerably northwest of the axis of the Rockcastle River uplift. This structure in its northeastward extension across the South Fork of the Kentucky River one mile below the mouth of Lower Teges Creek in Clay County, passes into Southern Owsley County and crosses Buffalo Creek at the mouth of Brandy Branch.

The structural figure of this uplift, so pronounced in Western Clay and Eastern Laurel counties on the headwaters of the Rockcastle River, is here in Owsley County nothing more than that of a low and inconspicuous fold plunging to the Northeast. It is thought that it may die out entirely before it reaches Laurel Fork of Buffalo Creek. A sketch map showing the surface structure of upper Buffalo Creek accompanies this report. A profile prepared to scale at the bottom of this map indicates at a glance the nature of the regional surface structure of this part of Owsley County.

The productive oil wells of the Henry Oil Co. are seen to be high on the northwest limb of a local anticline which itself is synclinal. This productive anticline is almost as low structurally as the Rockcastle River uplift which in this region is also synclinal. Furthermore it is interesting to note that this broad syncline between the headwaters and the mouth of Buffalo Creek is about 100 feet deeper than the Eastern Kentucky geo-syncline as mapped in Perry County south and west of Buckhorn. This structural depression must therefore be a closed or basin syncline—unusual, however, only because of its comparative depth and isolation.

Production

Oil runs in the Buffalo Creek pool commencing in December, 1924, reached high points of 639 and 600 barrels respectively in March and September, 1925. Actual pipe line runs follow:

PETROLEUM PRODUCTION

Buffalo Creek Pool, Owsley County, Kentucky.

1924	
December	186
1925	
January	325
February	247
March	639
April	336
May	397
June	559
July	322
August	499
September	600
October	382
November	552
December	550
Total	5044

Extension of the Buffalo Creek Field

Prior to the drilling of the wells on Buffalo Creek actual surface indications of oil were limited to an extremely small oil and gas seepage about two miles down Buffalo Creek from the Henry Oil Co. No. 2 well. This seep is no doubt associated with the axis of the Rockcastle River uplift which is a very important doming anticline in its western extension into Clay and Laurel counties. This pronounced structure is marked at several points throughout its course—notably Burning Springs, Clay County, by natural gas seeps of frequently considerable size. The occurrence of these natural gas seeps along this structure is suggestive of subsurface faulting whereby ease of access to the drainage level may have been provided for the various oil and gases.

Interpreting the surface structure as mapped areas productive of oil in commercial quantities as defined by the Henry Oil Company wells seem to be confined to the Northwest flank of a local fold in a basin syncline of possibly considerable size. Wells drilled a little farther up stream at the mouth of Billy Branch and Lick Branch in the broad and flat synclinal terrace which extends for two miles above the Henry wells and Rockhouse

Branch were unproductive. Based on structural features alone this fact invalidates the entire terrace as suitable productive drilling territory. Three wells drilled below the Henry wells from Upper Highland Branch to Harrison's Branch were unproductive, thereby condemning lower structural positions.

Evidently, therefore, unless other unknown factors such as irregular porosity enter into the problem, only a narrow elongate field following closely the 930 foot contour or Henry No. 1 well may logically be expected to produce. Variable extensions of the productive area of this field may possibly be made on Oldhouse Creek and on the middle waters of Billy Branch. Detailed information relative to the well drilled just below Roans Branch is lacking. If for any reason this was not a fair test, territory located on Brandy Branch of Rattlesnake Creek would become important from a prospecting standpoint and might produce. Carrying the logic of structure further, leases on the upper waters of Buffalo Creek between Beatty Branch and Barbecue Branch being located on the Northwest flank of a considerable anticline might also be productive of oil in commercial quantities.

Island Creek Pool

Northwest of the Buffalo Creek region herein described, a number of wells have been drilled within the last two or three years, some of which have been successful. Six miles from the mouth of Island Creek in the vicinity of Island Creek Knob (1300 feet) about five wells have been drilled. The last of these wells was brought in November 7, 1925, and according to report made 40 barrels in four days. This well is 740 feet deep and the oil production came from the "Big Lime." Another well in this vicinity about three miles from Brewers Store drilled in in the Fall of 1925 by Monroe Meguire, E. M. Sexton and others of Beattyville is reported to have produced approximately one barrel per hour natural at a depth of 670 feet. The oil is reported to have tested about 42° baume gravity. This well was contracted for Beamer and Son of Clay City. The production came from the "Big Lime."

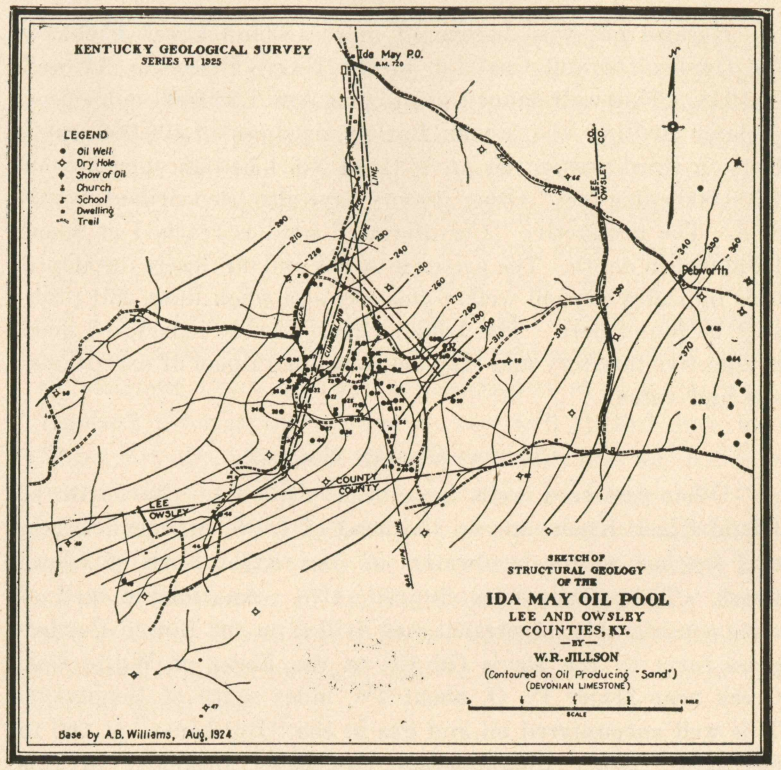
Natural gas was discovered in the Island Creek Field by the Owsley Oil and Coal Co. in the Harve Price No. 11 well in 1918. This well gauged flush open flow 1,250,000 cubic feet. A later drilling the Rufus Barker produced 1,100,000 cubic feet. A third gasser, the Aleck Bond No. 1 had an open flow of 1,050,000 cubic feet. Other gassers have also been drilled in this field. The productive "Corniferous" sand is reached at about 1,200 feet in depth. The presence of gas and oil closely developed here indicates that oil wells unusually size when flush will probably be found here. The Island Creek area is considered good perspective territory and may develope an oil pool of exceptional size and value.

Central Owsley County

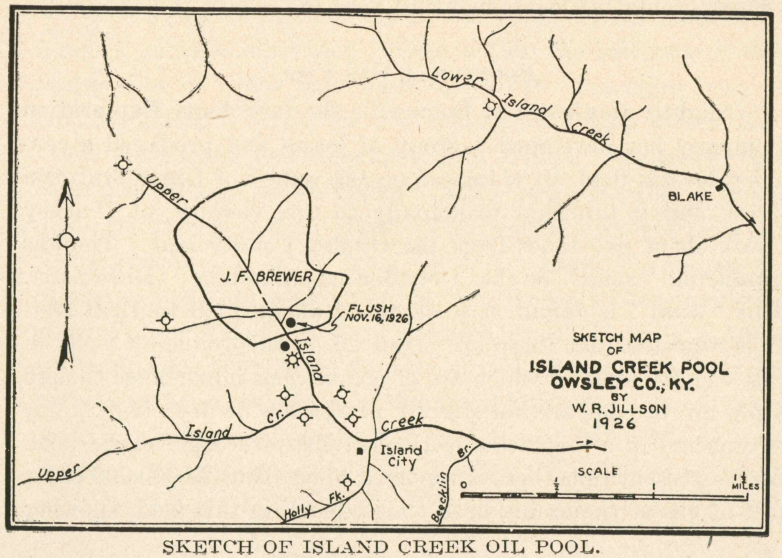
Other scattered wells have been drilled to the north of Island Creek Knob; one on the head of Little Sturgeon Creek, and another on the headwaters of the Right Fork of Island Creek. These wells were unproductive. An isolated well of some considerable importance was drilled on the Bowen Pendergrass farm by the Davis Oil Co. at the Forks of White Oak Creek near Major P. O. about 4½ miles south of Booneville. This well encountered oil and gas in the "Big Lime" at 660 to 662 feet. Other drillings are now being proposed in this vicinity, tentative locations being near the mouth of Cow Creek.

Boonsville Gas Pool

Slightly southwest of Booneville the Petroleum Exploration Company has developed a group of leases and produced a considerable gas field. It is located on the waters of Little Sturgeon Creek and it branches principally to the vicinity of Turkey Creek about five miles from the Owsley County seat. The gas producing "sand" is the Corniferous limestone (Devonian). This "sand" is found at a depth of about 1250 to 1350 feet. It is reported that there are about 25 or 30 producing wells in this vicinity most of which are of commercial importance though a few on the edge are but slightly productive or dry. Salt water is reported in a few wells on the southeastern edge of the pool. At the present time there is reported to be about 25,000,000 cubic feet of gas at the casing head "closed in" in this field, showing



GEOLOGICAL MAP IDA MAY POOL.



SKETCH OF ISLAND CREEK OIL POOL.

rock pressure varying from 225 to 360 pounds. A number of dry wells have been drilled on Sturgeon and Little Sturgeon Creeks, and the limits of the gas pool are now well defined.

Carbon black was produced by the Petroleum Exploration Co. for a short time from these wells in the Booneville gas field but following the depression in this industry during the last eighteen months, this work has been abandoned. At the present time efforts are being made to pipe this gas to Central Kentucky where it is greatly needed for city public utility purposes.

Ida May Oil—Pebworth Pools

About two miles south of Ida May postoffice close to the Lee-Owsley County line, but principally in Lee County, an oil field of more than ordinary importance was discovered by Indian-Tex Petroleum Co. in the fall of 1923. The structure of this field as worked out by the use of well logs and casing head elevation on the "Sand". The oil occurs in the Corniferous (Devonian) limestone which is reached at a depth of about 1250 feet. The productive field is contained within about 8 or 10 leases. Upwards of 120 wells have been drilled in this vicinity and 101 wells are now reported to be producing.

An eastward extension of the field is found on the divide and at the head waters of Elk Fork about ½ mile south of Pebworth post office in Owsley County. This oil pool is so situated as to be within about one-half mile of the South Fork of the Kentucky River. About twenty wells have been drilled in this vicinity fifteen of which are oil producers. Production in the Ida May pool is from the "Corniferous (Devonian) limestone. Drilling depths are slightly greater due to "down dip" and water shed location.

The peak of production of the Ida May pool, 28,199 barrels was reached in July, 1924, since when the pool has declined. The Pipe Line Co. Casing head elevations range from about 825 to 1150 feet above sea level.

Ida May Oil Pool.

The best wells in the Ida May Oil Pool were found on portions of the George Botner, David Mays, Spence Flannery and Ben Smith farms. Other close in and productive leases were

the George Porter, J. E. Mays, Widow Porter, Hag Rowland, Rufus Jackson, Louisa Brandenburg, Susie Newman, Fred Evans, Andy J. Combs, John Mays, Fred Edwards and Elmer Evans.

PETROLEUM PRODUCTION

Ida May Pool, Owsley and Lee Counties, Ky.

1924		1925	
January	..... bbls.	January	14,254 bbls.
February	180 bbls.	February	11,397 bbls.
March	2,222 bbls.	March	11,921 bbls.
April	7,785 bbls.	April	11,646 bbls.
May	20,291 bbls.	May	11,612 bbls.
June	25,933 bbls.	June	9,939 bbls.
July	28,199 bbls.	July	8,847 bbls.
August	20,135 bbls.	August	9,106 bbls.
September	24,135 bbls.	September	8,250 bbls.
October	23,928 bbls.	October	7,963 bbls.
November	16,395 bbls.	November	6,897 bbls.
December	18,367 bbls.	December	7,472 bbls.
Total	187,567 bbls.	Total	119,304 bbls.

CASING HEAD ELEVATIONS*

Ida May Oil Pool, Lee and Owsley Counties, Ky.

Form	No. Well	Elev.
F. Evans	3	1025
E. Evans	3	1002
F. Evans	1	954
Combs	2	929
F. Evans	4	973
D. Mays	1	819
D. Mays	2	1063
D. Mays	2	
D. Mays	4	1115
D. Mays	5	1116
D. Mays	6	1100
D. Mays	7	872
D. Mays	8	1005
D. Mays	9	932
D. Mays	10	932
D. Mays	11	914
W. Porter	1	1150
W. Porter	2	1122
J. Mays	1	1055

*Supplied by Petroleum Exploration Co., Lexington, Ky.

Form	No. Well	Elev.
J. Mays	2	1052
Dora Mays	1	1125
E. Newman	1	816
Dunagan	1	837
B. Smith	1	1110
B. Smith	2	1118
J. Porter	1	1139
G. Porter† (oil)	1	1100
G. Porter† (dry)	1	1008
C. Jackson	1	905
S. Newman	1	1054
G. Botner	1	1060
G. Botner	2	1077
G. Botner	3	1013
G. Botner	4	983
G. Botner	5	989
G. Botner	6	959
G. Botner	7	1039
G. Botner	8	913
G. Botner	9	1062
G. Botner	10	1071
Brandenburg	1	938
Brandenburg	2	895
Brandenburg	3	929
Gourlay	1	824
Jackson	1	986
Jackson	2	1057
S. Flannery	1	970
S. Flannery	2	1100
S. Flannery	3	1066
S. Flannery	5	1062
S. Flannery	6	993
S. Flannery	7	988
B. Smith	1	1051
B. Smith	2	1063
B. Smith	3	1010
B. Smith	4	1002

†Two separate tracts and separate wells.

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Manuscript written December, 1924.
Revised November, 1926.

IX.

RECENT PRODUCTION OF PETROLEUM IN KENTUCKY

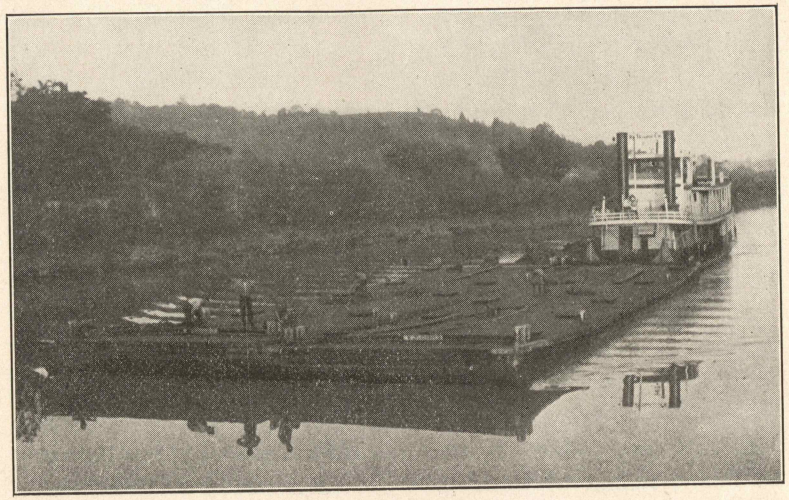
Petroleum has long been recognized in Kentucky, the first pool having been brought to the surface in this State as the result of salt well drilling operations within the present boundary of McCreary County on the waters of the South Fork of the Cumberland River in 1819.* Additional discoveries of petroleum at shallow depth in widely separated districts continued to be made in the years which followed up to the time of the Civil War. At this early period—before the prolific Pennsylvania and West Virginia pools began to produce—a number of rich shallow oil fields, recently developed in Kentucky, were definitely indexed.

During the decade which followed the close of the Civil War, interest was again revived in oil production in Kentucky. This came as a natural Southwestward expansion of the industry in Pennsylvania where it had gained a strong foothold as a result of the successful drilling efforts of Colonel Edwin Drake and his associates at Watson's flat on Oil Creek in 1859. In 1883 Kentucky produced a recorded 4,755 barrels which was an average measure for the next decade. During the close of the century, however, in 1899, this volume suddenly increased to 18,280 barrels which marked the opening of the Ragland Oil pool, and indicated the modern expansion of the industry culminating in the production of 1,217,337 barrels in 1905. This volume gradually diminished to 407,087 in 1915.

In 1916 the World War demand for petroleum accompanied by a rapid heightening of prices of crude oil stimulated a new wave of development and "wild-catting" in Kentucky which brought about the discovery of a number of new pools, chief of which have been the Big Sinking in Lee County, the Warren and Allen County Pools, the Cumberland and Monroe County pools, the Johnson and Magoffin County pools, and the Martha pool in Johnson and Lawrence Counties. Other pools which have been discovered are the Ross Creek, Station Camp,

[1] Oil and Gas Resources of Ky., W. R. Jillson, Series V., Bul. 1, pp. 3-4, 1920, Ky. Geol. Survey.

and Cow Creek pools in Estill County; the Ida May pool in Lee and Owsley Counties, and the Extension of the Busseyville and Louisa pools in Lawrence County. Within the last two or three years the Pellville oil pool in Hancock, Ohio and Daviess Coun-



BARGING LEE COUNTY OIL TO LOUISVILLE

A considerable proportion of Big Sinking petroleum is run by barge down the Kentucky and Ohio rivers to the refineries at Louisville, Ky. This view is on the lower Kentucky.

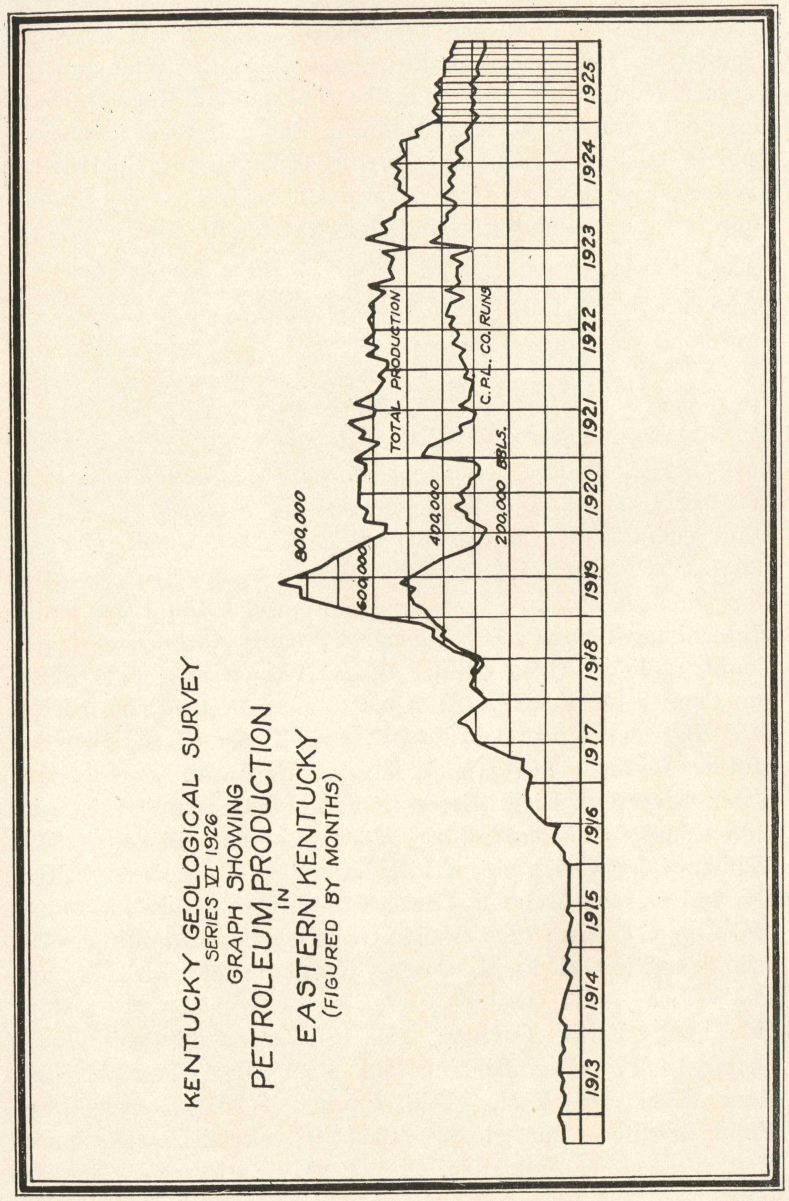
ties and the Morton's Gap pool in Hopkins County have been opened and successfully extended. Various strikes have also been made the extent of which is at present undetermined in Southern Owsley County on Buffalo Creek, Western Laurel County on Sinking Creek, Western Carter County on Smoky Creek, and elsewhere. Older pools, such as those in Wayne, Whitley, Knox, Floyd, and Knott Counties have been extended in some instances, produced to the end of their economic life, and finally abandoned.

Petroleum production in Kentucky increased from less than one million barrels in 1925 to 1,144,750 barrels in the succeeding year, 1916. From thence on production doubled each year until 1919 when the peak of production in this State 9, 226,473 barrels were produced. During the years which have followed the total production has declined in this State about one million barrels a year; and the rate of decline in some in-

stances as in Lee and Warren counties where the oil has been produced from the Corniferous (Devonian) limestone has been offset by the simultaneous development of new and long life production from such real silica "sands" as the Wier and the Berea (Lower Mississippian) in the Johnson and Magoffin counties pool, and the Martha (Johnson and Lawrence counties) pool in Eastern Kentucky. During 1925 the total petroleum production of this State was 6,658,803.39 barrels. At the present time there are about fifty-three productive oil and gas pools in Kentucky. Some of these have practically reached the economic limit of production, others are now at their peak, while still others are only indexed.

Kentucky Oil and Gas Fields

(1) Brandenburg Gas Field, Meade County; (2) Cloverport Gas Field, Breckinridge County; (3) Pellville Oil Pool, Hancock, Daviess, and Ohio counties; (4) Hartford Oil Pool, Ohio County; (5) Leitchfield Oil and Gas Field, Grayson County; (6) Meredith Gas Field, Grayson County; (7) Morton's Gap Oil Pool, Hopkins County; (8) Penrod Oil and Gas Field, Muhlenburg County; (9) Diamond Springs Gas Field, Logan County; (10) Warren County Oil and Gas Fields; (11) Simpson County Oil Pools; (12) Allen County Oil and Gas Fields; (13) Barren County Oil Pools; (14) Kettle Creek Oil Pool, Monroe County; (15) Cumberland County Oil Pools; (16) Green River Gas Field, Green and Taylor Counties; (17) Lincoln County Oil Pools; (18) Wayne County Oil Pools; (19) Williamsburg Gas Field, Whitley County; (20) Knox County Oil and Gas Fields; (21) Rockcastle River Gas Field, Laurel and Clay Counties; (22) Oneida Gas Fields, Clay County; (23) Island Creek Gas Field, Owsley County; (24) Ida May Oil Pool, Lee and Owsley Counties; (25) Station Camp Oil Pool, Estill County; (26) Irvine Oil Pool, Estill County; (27) Big Sinking Oil Pool, Lee County; (28) Ross Creek Oil Pool, Estill County; (29) Rothwell Gas Field, Menifee County; (30) Brush Creek Oil Pool, Menifee County; (31) Ragland Oil Pool, Bath and Menifee Counties; (32) Campton Oil Pool, Wolfe County; (33) Stillwater Oil Pool, Wolfe County; (34) Frozen Creek Gas Field,

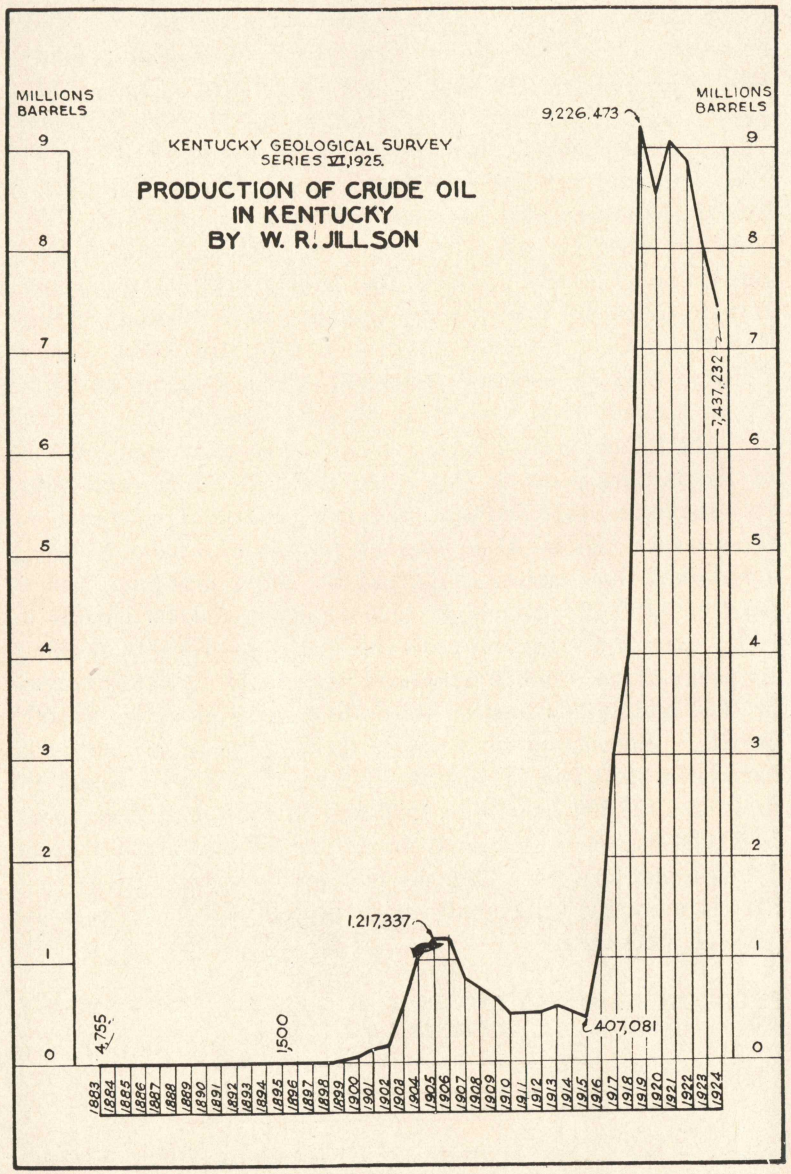


Breathitt County; (35) Hiseville Gas Field, Barren County; (36) Cannel City Oil and Gas Pool, Morgan County; (37) Knott County Oil Pools; (38) Beaver Creek Oil and Gas Field, Floyd County; (39) Burning Fork Gas Field, Magoffin County; (40) Prestonsburg Oil and Gas Field, Floyd County; (41) Paint Creek Oil and Gas Field, Johnson and Magoffin Counties; (42) Laurel Creek Oil and Gas Field, Johnson County; (43) Elliott County Oil and Gas Fields; (44) Martin County Gas Field; (45) Bussyville Oil Pool, Lawrence County; (46) Fallsburg Oil Pool, Lawrence County; (47) Bolts Fork Oil Pool, Boyd County; (48) Ashland Gas Field, Boyd County; (49) Buffalo Creek Oil Pool, Owsley County; (50) Burning Springs Gas Field, Clay County; (51) Booneville Gas Field, Owsley County; (52) Rock Haven Gas Field, Meade County; and (53) Upper Licking River Gas Field, Magoffin County.

The following detailed statement of the production of some of the leading pools of this State showing volume and value within recent years indicates the comparative importance of these several pools. Allen and Warren counties have definitely determined their curves of decline, the latter dropping from a peak of 1,011,238 barrels in 1923 to about 460,000 barrels in 1925. Barren County, all pools considered, is probably at about its peak. Estill County witnessed its peak of 1,109,782 barrels in 1920 and is now low on its decline curve at about 450,000 barrels. Johnson County established its peak at 1,015,005 barrels in 1923 and is now on decline. Lee county found its peak of 5,128,609 barrels in 1920 and in 1925 with only about 1,800,000 barrels is definitely in decline. The Martha Pool in Johnson and Lawrence Counties now producing about ——— barrels annually is the only large pool in Kentucky near its peak of production.

PRODUCTION OF PERTROLEUM IN BARRELS IN KENTUCKY FROM 1883 TO 1925

1883	4,755
1884	4,148
1885	5,164
1886	4,726
1887	4,791
1888	5,096
1889	5,096



PRODUCTION OF PETROLEUM IN BARRELS IN KENTUCKY FROM 1883 TO 1925—Continued.

1890	6,000
1891	9,000
1892	6,500
1893	3,000
1894	1,500
1895	1,500
1896	1,680
1897	322
1898	5,568
1899	18,280
1900	62,259
1901	137,259
1902	185,331
1903	554,286
1904	998,284
1905	1,217,337
1906	1,213,548
1907	820,844
1908	727,767
1909	639,016
1910	468,774
1911	472,458
1912	484,368
1913	522,550
1914	479,609
1915	407,081
1916	1,144,750
1917	3,015,640
1918	4,035,950
1919	9,226,473
1920	8,546,027
1921	9,080,845
1922	8,889,303
1923	8,087,250
1924	7,437,232
1925	6,658,803
Total	75,600,170

KENTUCKY PETROLEUM PRODUCTION

Volume and Value 1922

	Bbls.	Value
January	695,022.10	$1,435,573.63
February	700,120.89	1,417,429.55
March	760,618.28	1,542,858.88

KENTUCKY PETROLEUM PRODUCTION

Volume and Value 1922

	Bbls.	Value
April	724,958.47	1,473,142.95
May	797,615.44	1,709,540.72
June	752,087.11	1,636,217.39
July	770,901.88	1,490,271.97
August	792,590.19	1,418,353.52
September	648,584.84	1,150,444.69
October	853,495.69	1,585,587.64
November	681,130.69	1,265,478.07
December	712,177.97	1,407,867.33
Totals	8,889,303.55	$17,532,766.34

Value of state tax from petroleum for 1922	$177,732.27
Value of county tax from petroleum for 1922	88,866.13
Total petroleum tax	$266,598.40

In 1921 Kentucky produced 9,080,845 barrels of petroleum valued at $16,674,960.00. The year 1922, therefore, registers a loss of 191,542 barrels but because of an increase in price per barrel an actual increase of $857,797.00 in value despite the loss in volume. The peak of volume production of petroleum in Kentucky was reached in 1919 when 9,226,473 barrels were produced. The increase price per barrel, however, made 1920 the banner year for value, oil producers in Kentucky then receiving $33,556,241.00 or nearly twice as much as they did during 1922.

OIL FIGURES FROM TAX COMMISSION

1923

	Bbls.	Value
January	748,870.11	$1,816,339.00
February	631,100.41	1,716,578.02
March	723,129.73	1,759,647.74
April	675,236.05	1,583,674.59
May	666,934.73	1,345,382.75
June	686,646.32	1,166,414.50
July	605,779.80	950,910.69
August	738,742.66	1,150,346.08
September	665,702.65	954,472.43
October	682,552.74	915,515.73
November	623,176.81	821,673.98
December	639,378.17	1,008,960.83
Total	8,087,250.18	$15,189,916.34

1924

	Bbls.	Value
January	592,350.00	$1,241,295.72
February	596,147.33	1,418,560.50
March	669,482.69	1,548,813.65
April	640,722.83	1,482,698.06
May	653,442.76	1,476,479.80
June	619,292,51	1,186,532.24
July	678,369.29	1,178,879.54
August	611,984.34	1,010,996.27
September	620,414.00	1,017,394.54
October	624,569.09	1,014,866.52
November	569,900.86	921,824.54
December	560,557.12	920,640.62
Total	7,437,232.82	$14,418,982.00

1925

	Bbls.	Value
January	563,936.24	$1,100,235.49
February	535,704.41	1,244,107.21
March	600,934.25	1,416,884.68
April	570,689.16	1,295,090.09
May	574,446.08	1,392,017.78
June	553,048.58	1,376,310.69
July	592,151.01	1,484,164.60
August	546,815.39	1,285,033.64
September	555,331.11	1,251,706.83
October	543,497.46	1,166,079.13
November	518,139.82	1,147,126,36
December	504,109.88	1,131,411.04
Total	6,658,803.39	$15,290,167.54

ALLEN COUNTY OIL PRODUCTION

1919

	Bbls.	Value
July	67,450.05	$141,645.11
August	53,199.06	111,718.03
September	60,880.04	132,740.69
October	70,305.61	154,452.00
November	57,250.25	129,066.00
December	62,546.39	159,558.00
Total	371,631.40	$829,179.83

1920

	Bbls.	Value
January	61,629.42	$176,700.00
February	63,248.06	146,349.28
March	66,383.72	224,047.55
April	96,003.37	327,129.37
May	101,552.40	350,085.29
June	77,702.42	268,073.33
July	75,186.18	260,552.49
August	85,760.50	297,607.18
September	72,602.84	251,396.37
October	76,019.79	283,205.62
November	56,916.59	222,774.17
December	55,794.82	218,544.36
Total	888,809.11	$2,758,465.01

1921

January	56,980.56	$208,105.22
February	65,046.89	161,206.12
March	57,908.17	77,969.62
April	62,685.24	90,384.14
May	57,113.12	84,912.56
June	52,477.60	53,606.19
July	41,049.65	24,138.91
August	39,513.21	26,542.64
September	39,434.71	31,247.84
October	41,694.19	60,799.96
November	41,881.11	86,503.90
December	44,008.56	91,466.27
Total	599,793.01	$996,883.37

1922

January	39,078.58	$64,111.38
February	40,537.98	64,234.97
March	45,607.74	72,195.58
April	46,871.28	74,227.22
May	49,555.74	78,490.65
June	54,881.63	99,313.94
July	67,191.35	107,703.86
August	75,431.99	100,360.46
September	65,799.67	87,562.10
October	62,528.80	87,947.23
November	48,642.25	67,635.42
December	45,429.22	69,228.31
Total	641,556.23	$973,011.12

1923

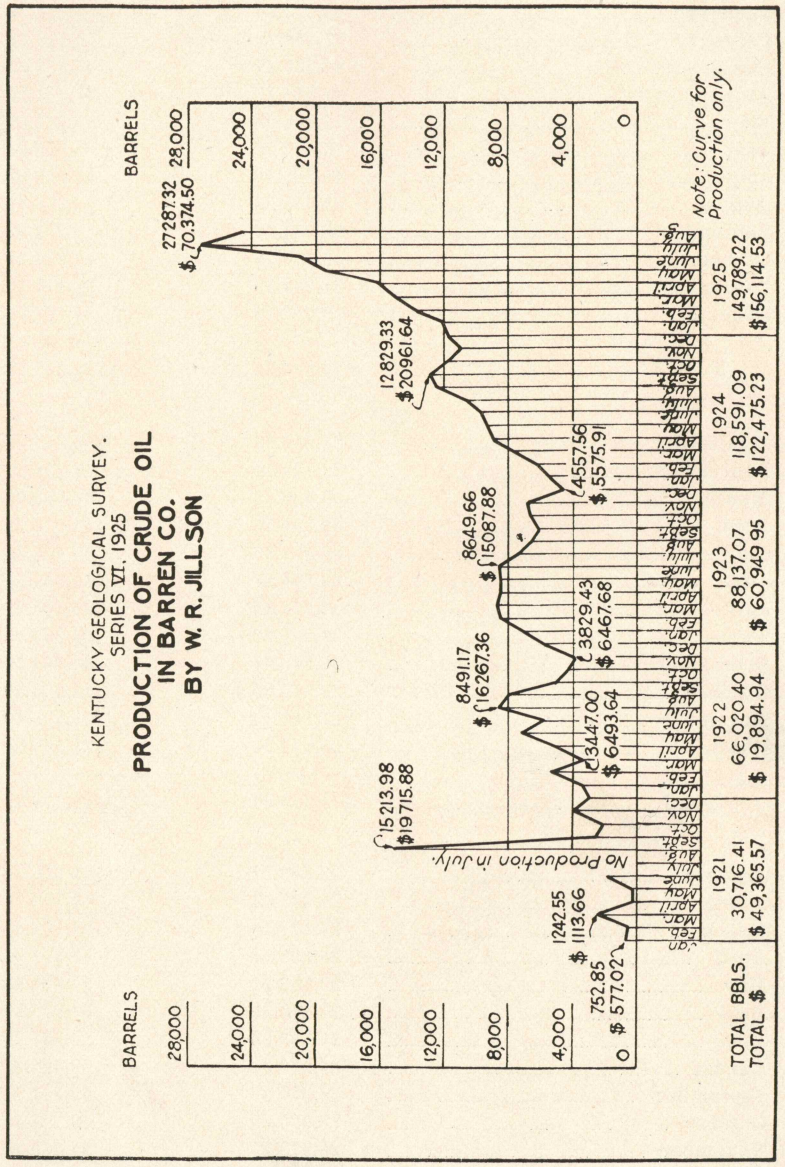
	Bbls.	Value
January	45,622.50	$85,196.10
February	37,488.27	86,140.23
March	44,527.29	106,723.51
April	42,611.77	91,931.51
May	45,861.08	78,161.17
June	45,274.79	68,060.27
July	40,899.13	53,008.68
August	41,530.98	52,258.95
September	36,084.12	43,281.92
October	36,310.15	40,091.15
November	31,071.45	32,173.13
December	29,706.78	31,464.60
Total	476,988.31	$768,521.22

1924

January	23,250.99	$36,374.76
February	29,719.44	62,326.28
March	30,452.43	66,958.68
April	40,249.80	91,018.59
May	39,387.20	80,608.38
June	34,604.97	61,852.58
July	36,054.26	56,765.78
August	31,865.92	43,060.35
September	27,848.47	34,951.69
October	30,951.55	35,853.36
November	23,801.93	29,599.40
December	23,272.94	29,100.94
Total	371,459.90	$628,470.79

1925

January	25,360.21	$32,825.34
February	24,368.02	44,700.71
March	27,477.70	54,103.88
April	28,288.74	55,376.91
May	27,752.11	54,366.48
June	27,410.99	54,572.13
July	28,593.28	58,367.79
August	26,279.31	53,598.64
September	26,915.87	49,141.71
October	22,665.05	40,291.19
November	20,973.59	35,980.29
December	18,426.16	31,476.96
Total	304,511.03	$564,802.03



1926

	Bbls.	Value
January	19,900.08	$34,206.91

BARREN COUNTY

Producing "Sand:" Devonian limestone (Hamilton and Onondaga) mainly, occasionally from the Silurian limestone (Niagara), and less frequently from the Upper Ordovician.

1921

	Bbls.	Value
January	752.85	$2,409.12
February	577.02	1,702.21
March	1,242.55	1,113.66
April	192.21	115.33
May	237.24	332.13
June	955.93	1,261.83
July	.....	.....
August	15,213.98	19,715.88
September	2,559.50	2,790.89
October	2,088.74	3,897.57
November	4,022.05	9,128.51
December	2,874.34	6,898.44
Total	30,716.41	$49,365.57

1922

	Bbls.	Value
January	3,487.22	$6,805.83
February	5,413.22	10,082.13
March	3,447.00	6,493.64
April	5,118.51	9,595.72
May	7,140.83	13,368.67
June	5,641.93	11,955.84
July	8,491.17	16,267.36
August	8,139.86	13,319.23
September	5,041.48	8,148.77
October	4,288.12	7,232.12
November	3,829.43	6,467.68
December	5,981.63	10,157.95
Total	66,020.40	$19,894.94

1923

	Bbls.	Value
January	7,111.96	$14,564.78
February	8,534.60	19,569.84

1923

	Bbls.	Value
March	8,713.16	22,711.88
April	8,492.24	20,135.39
May	8,421.22	16,320.07
June	8,649.66	15,087.88
July	7,488.85	11,141.59
August	6,557.05	9,637.46
September	6,008.76	8,722.50
October	6,761.32	8,829.59
November	6,840.69	8,653.06
December	4,557.56	5,575.91
Total	88,137.07	$60,949.95

1924

January	5,556.40	$9,627.24
February	6,368.31	13,817.26
March	7,856.38	18,166.72
April	8,997.60	21,226.59
May	9,309.14	20,576.81
June	9,760.93	19,690.09
July	10,622.58	19,188.15
August	12,525.55	20,830.87
September	12,829.33	20,961.64
October	11,872.98	19,948.16
November	11,039.98	18,560.77
December	11,851.91	19,880.93
Total	118,591.09	$122,475.23

1925

January	12,154.13	$21,299.91
February	13,940.42	30,274.36
March	15,264.67	36,712.54
April	16,909.57	37,181.24
May	19,536.67	45,479.42
June	20,919.62	53,169.43
July	27,287.32	70,374.50
August	24,676.82	61,623.13
Total	149,789.22	$156,114.53

September, October, November, December, 1924, and January and February, 1925, are estimated as a delinquent report for six months was sent in in one lump sum. The amount was divided equally into six parts and distributed among the six months.

ESTILL COUNTY

Producing "Sand:" Devonian limestone (Onondaga)—"Irvine Sand"— and occasionally from the Silurian limestone (Niagaran). No deep sands producing.

1919

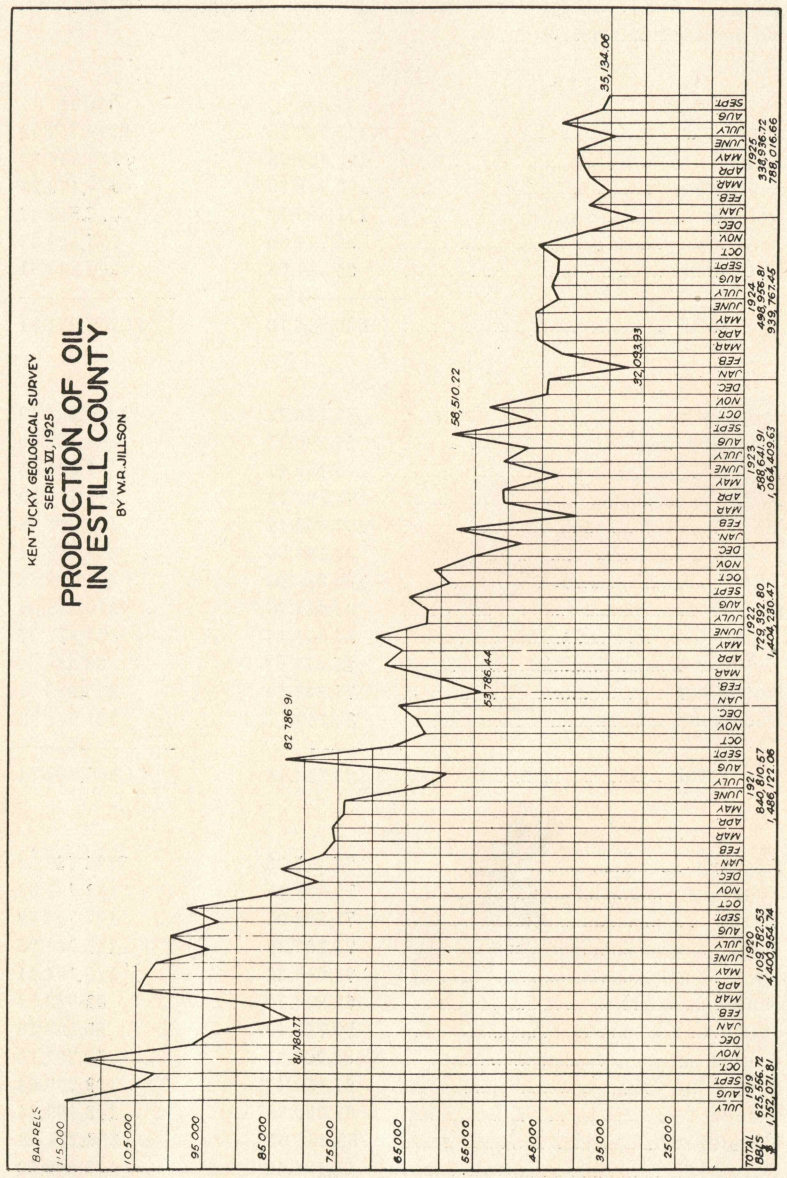
	Bbls.	Value
July	115,292.15	$299,759.59
August	105,424.38	282,546.23
September	102,048.76	275,470.22
October	112,489.79	317,913.47
November	96,774.06	275,528.39
December	93,527.58	300,853.91
Total	625,556.72	$1,752,071.81

1920

January	81,780.77	$265,686.49
February	86,280.31	318,452.00
March	104,459.17	391,626.55
April	103,392.79	411,416.99
May	102,059.18	407,645.68
June	94,134.96	376,539.84
July	100,288.42	401,153.68
August	92,623.76	370,495.04
September	97,667.49	413,372.07
October	85,477.01	366,942.87
November	77,869.50	335,952.21
December	83,749.17	341,671.32
Total	1,109,782.53	$4,400,954.74

1921

January	77,415.35	$193,462.54
February	75,508.75	133,821,98
March	75,844.94	127,718.69
April	74,197.39	145,949.26
May	74,043.33	125,104.21
June	62,833.10	63,029.52
July	59,350.40	55,102.16
August	82,786.91	92,701.10
September	67,152.44	109,390.64
October	62,090.88	148,480.84
November	63,462.62	156,274.53
December	66,124.46	135,086.59
Total	840,810.57	$1,486,122.06



1922

	Bbls.	Value
January	53,786.44	$107,343.09
February	60,116.98	118,267.56
March	68,410.82	134,763.99
April	65,526.94	129,393.92
May	69,756.76	152,240.44
June	62,092.38	137,835.09
July	61,844.77	108 793.28
August	64,719.24	111,434.63
September	58,782.47	101,115.80
October	60,986.76	108,483.58
November	55,161.49	98,350.87
December	48,207.75	96,208.22
Total	729,392.80	$1,404.230.47

1923

January	57,762.84	$142,916.74
February	40,175.79	107,594.37
March	50,760.40	121,385.21
April	50,862.16	109,766.57
May	42,554.57	82,642.66
June	50,649.49	79,656.80
July	47,063.75	72,464.74
August	58,510.22	88,474.21
September	48,884.31	66,249.63
October	52,834.21	66,664.49
November	44,336.50	55,818.26
December	44,247.67	70,775.95
Total	588,641.91	$1,064,409.63

1924

January	32,093.93	$68,435.67
February	42,065.84	98,231.57
March	45,865.07	108,391.02
April	45,862.05	98,507.97
May	46,134.56	97,870.61
June	42,802.17	76,646.16
July	43,524.17	70,664.82
August	42,867.42	68,570.26
September	42,777.75	68,501.42
October	45,669.16	73,008.30
November	38,280.66	61,160.88
December	31,014.03	49,778.77
Total	498,956.81	$939,767.45

1925

	Bbls.	Value
January	38,260.01	$78,185.20
February	35,140.70	82,050.66
March	38,084.80	89,301.99
April	39,132.95	86,384.93
May	39,949.57	98,675.56
June	34,474.91	86,436.92
July	42,496.75	105,944.97
August	36,262.97	82,325.25
September	35,134.06	78,711.18
October	35,439.37	74,363.59
November	33,546.45	74,626.33
December	28,560.27	64,113.78
Total	436,482.81	$1,001,120.36

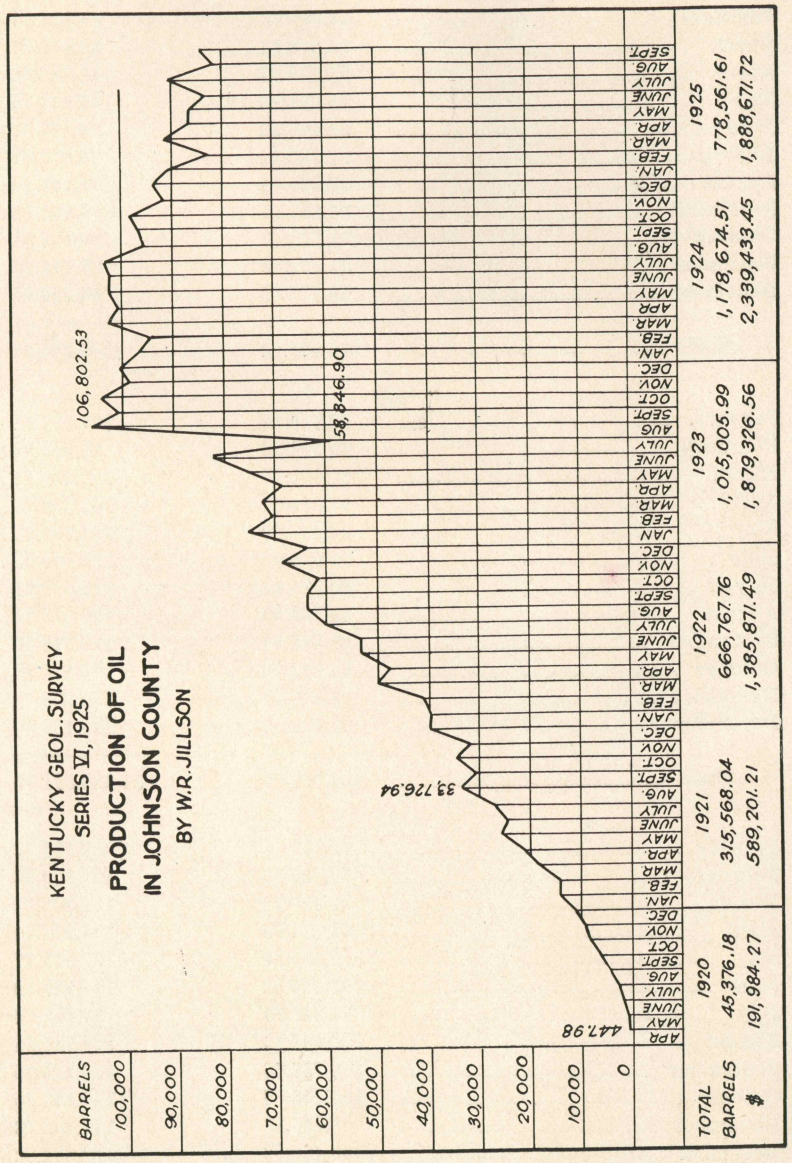
	Bbls.	Value
1919	625,556.72	$1,752,071.81
1920	1,109,782.53	4,400,954.74
1921	840,810.57	1,486,122.06
1922	729,392.80	1,404,230.47
1923	588,641.91	1,064,409.63
1924	498,956.81	939,767.45
1925	.....	.....
Grand total from July, 1919, to September, 1925, inclusive	4,393,141.34	$11,047,556.16

JOHNSON COUNTY

Producing "Sand:" Mississippian sandstone, principally the Wier, and to slight extent the Berea, of Waverly age. No deep sands producing.

1920

	Bbls.	Value
April	447.98	$1,899.92
May	823.90	3,295.60
June	1,642.87	6,571.48
July	2,800.07	11,200.28
August	4,421.08	17,684.32
September	6,186.93	26,294.45
October	8,483.72	37,060.72
November	9,524.15	41,910.49
December	11,018.48	46,067.01
Total	45,376.18	$191,984.27



1921

	Bbls.	Value
January	14,119.46	$34,200.55
February	14,069.95	24,610.63
March	18,846.24	32,898.76
April	21,176.37	44,781.82
May	25,661.76	44,685.36
June	24,486.12	24,167.04
July	27,153.24	26,696.81
August	33,726.94	41,267.80
September	30,157.57	56,063.11
October	34,538.17	90,687.97
November	31,759.13	83,843.70
December	39,873.09	85,297.66
Total	315,568.04	$589,201.21

1922

January	39,713.30	$84.937.11
February	40,916.23	87,606.38
March	50,050.06	107,280.14
April	47,379.54	101,530.77
May	53,457.29	127,730.89
June	53,078.97	126,906.55
July	60,774.94	115,062.77
August	63,966.95	120,975.34
September	63,842.50	120,598.30
October	61,322.26	119,476.35
November	68,895.07	134,299.49
December	63,370.65	139,467.40
Total	666,767.76	$1,385,871.49

1923

January	75,305.58	$203,154.75
February	70,223.50	199,909.26
March	72,627.39	181,302.62
April	68,734.86	154,214.60
May	75,152.94	153,313.77
June	83,026.38	132,875.89
July	58,846.90	94,017.02
August	106,802.53	170,736.84
September	100,737.66	146,133.56
October	104,346.86	140,893.65
November	98,795.13	133,402.78
December	100,406.26	169,371.82
Total	1,015,005.99	$1,879,326.56

1924

	Bbls.	Value
January	96,822.30	$226,274.59
February	94,324.45	234,582.66
March	102,727.64	255,433.76
April	100,547.84	225,106.52
May	102,636.80	229,866.49
June	102,396.62	188,551.25
July	103,385.12	174,848.19
August	95,895.50	162,266.72
September	96,387.58	162,995.58
October	98,280.85	166,164.89
November	91,366.74	154,539.01
December	93,903.07	158,803.79
Total	1,178,674.51	$2,339,433.45

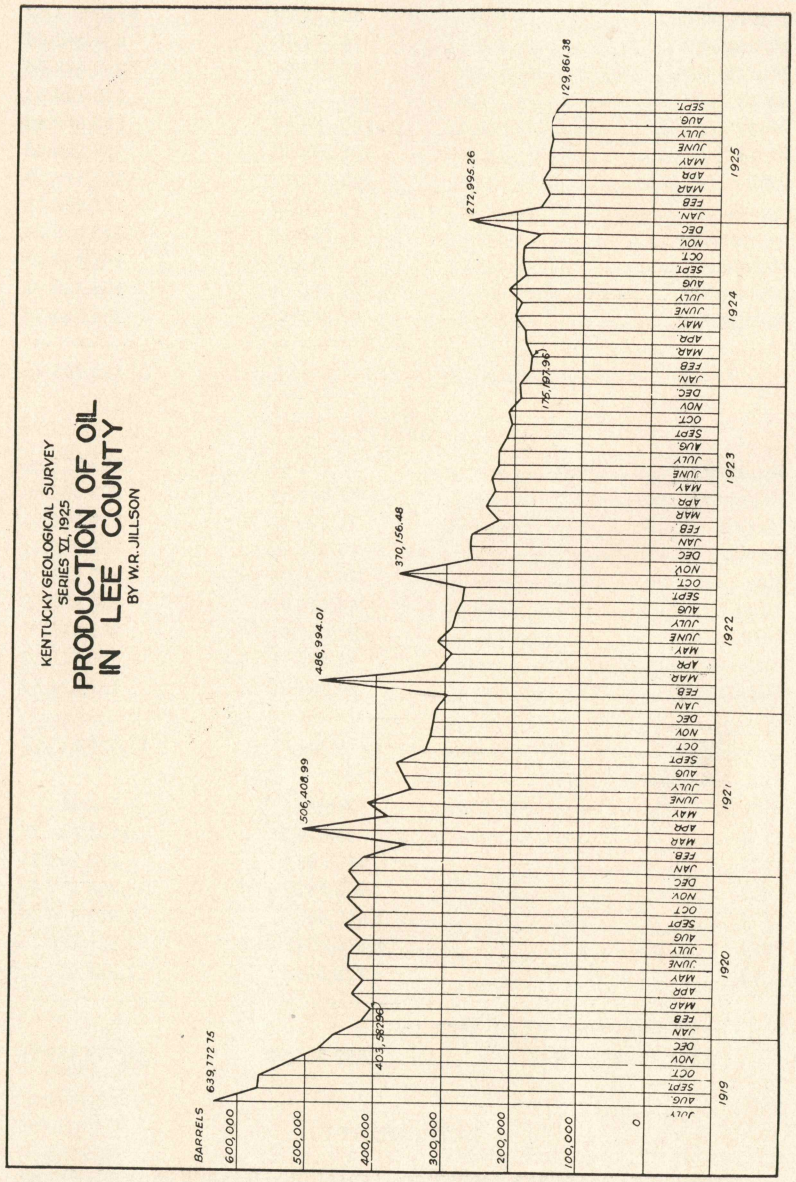
1925

January	90,715.41	$198,771.00
February	82,882.54	202,354.45
March	91,600.20	223,726.05
April	86,773.75	198,963.24
May	86,825.66	225,213.08
June	83,616.45	216,883.19
July	90,658.68	235,016.77
August	81,285.96	190,519.12
September	84,202.96	197,224.82
Total	778,561.61	$1,888,671.72

	Bbls.	Value
1920	45,376.18	$191,984.27
1921	315,568.04	589,201.21
1922	666,767.76	1,385,871.49
1923	1,015,005.99	1,879,326.56
1924	1,178,674.51	2,339,433.45
1925	778,561.61	1,888,671.72
Grand total from April, 1920, to Sept., 1925 inclusive.	3,999,954.09	$8,274,488.70

LEE COUNTY

Producing "Sands:" Devonian limestone (Hamilton and Onondaga)—the "Corniferous" or "Big Sinking Sand," and occasionally the Silurian limestone (Niagaran). No deep sands producing.



1919

	Bbls.	Value
July	639,772.75	$1,663,409.14
August	570,152.39	1,519,903.00
September	568,946.10	1,534,407.38
October	521,617.12	1,456,213.52
November	479,224.56	1,369,661.64
December	457,245.34	1,427,717.73
Total	3,236,958.26	$8,971,312.41

1920

	Bbls.	Value
January	$418,069.06	$1,358,670.00
February	403,582.96	1,435,798.40
March	431,191.31	1,615,896.82
April	416,928.67	1,600,223.98
May	439,172,43	1,744,689.50
June	436,977.33	1,751,006.36
July	417,217.57	1,672,318.03
August	444,610.16	1,782,407.05
September	417,395.10	1,719,165.68
October	440,410.69	1,943,445.37
Novmber	424,487.53	1,915,030.98
December	438,567.11	1,917,481.00
Total	5,128,609.92	$20,456,133.17

1921

	Bbls.	Value
January	418,807.84	$1,361,875.70
February	353,594.71	747,371.66
March	506,408.99	696,051.05
April	381,288.04	765,979.40
May	413,708.93	822,648.92
June	349,207.17	486,106.64
July	360,194.68	351,392.36
August	370,682.48	424,444.28
September	328,821.65	470,320.93
October	321,692.54	715,818.49
November	316,333.25	837,199.27
December	313,765.79	795,976.14
Total	4,434,506.07	$8,475,184.84

1922

	Bbls.	Value
January	297,927.91	659,163.80
February	486,994.01	618,559.42
March	308,788.74	665,351.00
April	291,362.15	627,730.61
May	312,893.05	690,715.23
June	291,806.89	698,545.35
July	285,734.39	616,982.40
August	276,772.50	543,179.00
September	273,311.17	537,212.11
October	370,156.48	727,168.32
November	261,559.05	509,664.30
December	265,389.58	534,672.37
Total	3,722,695.92	$7,428,943.91

1923

January	264,088.92	$630,792.46
February	221,473.75	613,080.47
March	242,710.68	671,730.29
April	230,161,85	589,069.16
May	234,613.65	506,481.94
June	223,766.03	431,155.77
July	224,627.99	379,500.20
August	212,803.77	345,997.23
September	204,416.99	307,913.35
October	210,438.33	299,847.94
November	191,420.90	263,894.08
December	194,722.11	292,240.77
Total	2,655,244.97	$5,331,703.66

1924

January	179,958.42	$359,382.01
February	175,197.96	419,891.29
March	184,673.28	453,620.95
April	186,740.48	462,540.21
May	201,420.31	470,944.43
June	191,223.16	398,921.98
July	211,386.88	396,394.05
August	186,775.59	340,477.28
September	191,826.95	333,501.75
October	190,167.49	330,355.57
November	164,474.54	260,976.12
December	272,995.26	300,302.04
Total	2,336,840.32	$4,527,307.68

1925

	Bbls.	Value
January	165,570.59	$313,226.96
February	151,513.72	363,349.70
March	162,108.08	403,626.91
April	152,323.73	376,913.40
May	152,720.15	371,568.16
June	148,830.32	389,786.14
July	151,597.57	401,146.82
August	146,100.19	370,721.71
September	129,861.38	311,594.68
October	139,860.03	321,474.19
November	133,581.60	308,270.88
December	130,271.13	311,934.96
Total	1,764,338.49	$4,243,614.51

WARREN COUNTY

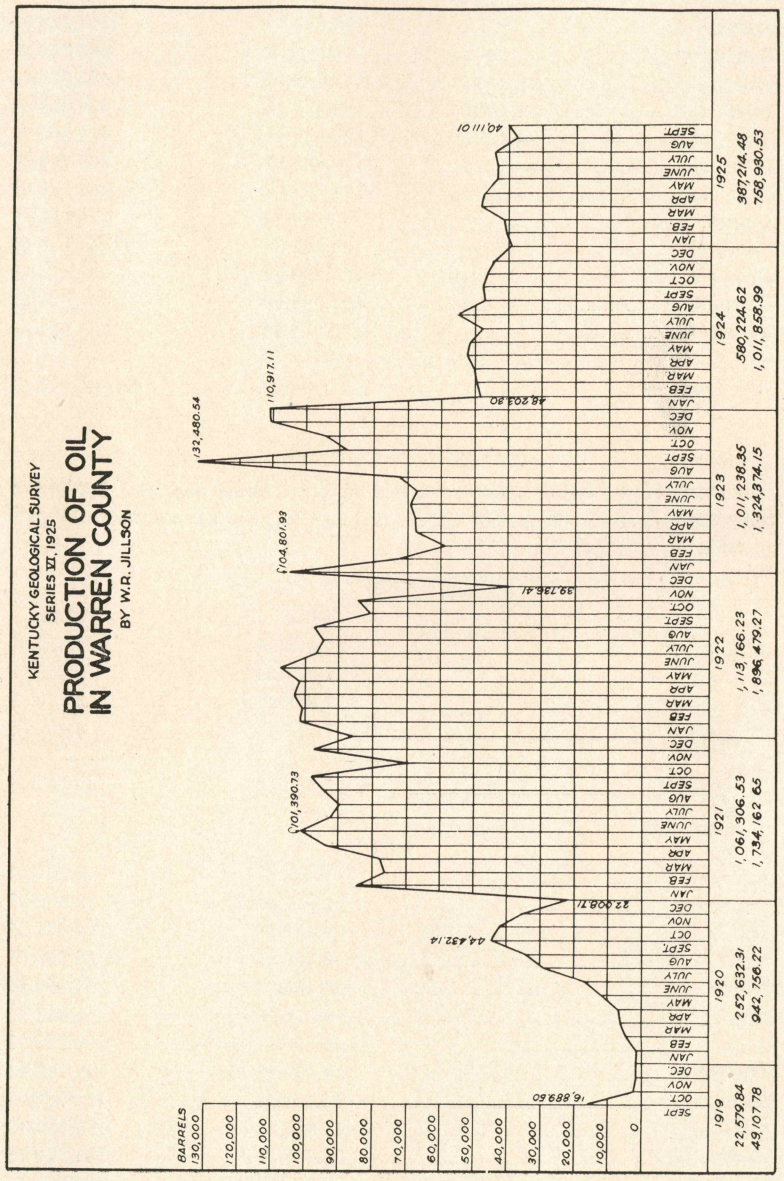
Producing "Sand:" Lower Mississippian limestone and Devonian and Silurian limestone. No deep "Sands" known as commercial producers.

1919

	Bbls.	Value
September	16,889.50	$35,819.00
October	2,277.24	5,009.93
November	1,658.94	3,870.30
December	1,754.16	4,408.55
Total	22,579.84	$49,107.78

1920

January	1,433.54	$4,158.11
February	4,417.50	13,020.25
March	6,082.33	20,421.21
April	6,686.07	23,009.02
May	11,458.72	41,203.26
June	16,294.05	59,053.32
July	28,530.91	104,328.91
August	34,107.13	124,722.10
September	44,432.14	164,356.54
October	41,962.82	166,353.45
November	35,218.39	136,918.88
December	22,008.71	85,211.17
Total	252,632.31	$942,756.22



1921

	Bbls.	Value
January	85,110.05	$299,763.82
February	76,320.89	162,529.34
March	77,856.77	106,057.34
April	93,416.71	146,499.97
May	101,390.73	144,307.48
June	92,644.05	86,048.74
July	89,746.99	56,370.81
August	94,749.74	68,652.21
September	98,141.57	101,519.00
October	69,284.29	169,085.04
November	97,205.30	207,070.63
December	85,439.44	186,258.27
Total	1,161,306.53	$1,734,162.65

1922

January	101,837.79	$180,815.30
February	100,636.07	174,047.39
March	103,222.26	179,287.53
April	101,788.85	179,296.53
May	107,732.94	189,846.94
June	96,833.30	193,867.17
July	94,473.42	167,402.00
August	97,699.84	147,065.94
September	80,228.77	120,939.60
October	84,124.65	132,429.81
November	39,736.41	57,980.62
December	104,801.93	173,500.44
Total	1,113,166.23	$1,896,479.27

1923

January	72,852.75	$146,043.89
February	58,604.70	143,636.89
March	67,400.97	171,181.50
April	67,793.69	154,004.77
May	69,144.24	126,870.99
June	67,447.93	114,953.65
July	72,190.47	99,750.83
August	132,480.54	89,708.66
September	87,324.71	77,968.95
October	94,258.51	75,340.04
November	110,800.00	61,694.96
December	110,917.11	63,219.02
Total	1,011,238.35	$1,324,374.15

1924

	Bbls.	Value
January	48,203.30	$83,625.77
February	49,979.86	106,362.18
March	50,013.35	119,588.23
April	52,093.27	119,652.00
May	51,508.51	108,269.30
June	47,932.22	89,132.62
July	55,252.39	90,649.09
August	47,042.32	66,587.89
September	47,936.57	65,716.75
October	46,369.57	59,963.64
November	44,136.00	48,950.68
December	39,757.26	53,360.84
Total	580,224.62	$1,011,858.99

1925

	Bbls.	Value
January	40,965.01	$58,330.68
February	41,679.23	81,088.17
March	48,251.63	100,069.69
April	47,381.58	96,555.12
May	43,427.08	88,140.33
June	43,564.35	87,988.64
July	44,145.16	92,254.57
August	37,689.43	79,174.44
September	40,111.01	75,328.89
October	36,915.50	67,879.71
November	31,864.08	56,751.89
December	33,652.09	59,984.27
Total	$489,664.15	$943,546.40

WARREN COUNTY OIL PRODUCTION.

	Bbls.	Value
1919	22,579.84	$49,107.78
1920	252,632.31	942,756.22
1921	1,061,306.53	1,734,162.65
1922	1,113,166.23	1,896,479.27
1923	1,011,238.35	1,324,374.15
1924	580,224.62	1,011,858.99
1925	.....	.....
	4,428,362.36	$7,717,669.59

Grand total from September, 1919, to September, 1925, inclusive.

WHITLEY OIL PRODUCTION.*

Producing "Sands:" Lower Pottsville (Pennsylvanian) Sandstones, and the "Big Lime" (Mississippi). No deep Sands producing.

1919

	Bbls.	Value
	Bbls.	Value
August	148.09	$399.84
September	149.68	404.14
October	.....	.....
November	149.61	426.39
December	142.01	461.53
Total	589.39	$1,691.90

1920

January	.....	.....
February	146.31	$548.66
March	144.60	542.25
April	142.12	568.48
May	140.55	562.20
June	112.82	451.28
July	.....	.....
August	140.37	561.48
September	148.39	630.65
October	.....	.....
November	145.70	619.23
December	.....	.....
Total	1,120.86	$4,484.23

1921

January	137.60	$309.80
February	140.23	231.38
March	.....	.....
April	150.00	292.50
May	141.37	226.14
June	140.26	126.23
July	150.05	135.05
August	149.82	164.80
September	.....	.....
October	.....	.....
November	.....	.....
December	293.84	558.30
Total	1,303.17	$2,044.19

*From Cumberland Pipe Line Co.

1922

	Bbls.	Value
January	.....	.....
February	.....	.....
March	.....	.....
April	.....	.....
May	149.75	$321.96
June	.....	.....
July	.....	.....
August	.....	.....
September	115.50	190.58
October	.....	.....
November	.....	.....
December	.....	.....
Total	265.25	$512.54

	Bbls.	Value
Grand total from August ,1919, to November, 1922, inclusive	3,278.67	$8,732.86

Production of Martha Oil Pool Lawrence and Johnson Counties, Ky.

	1920	1921	1922	1923	1924	1925
January	.....	21,977	51,269	102,860	126,116	137,369
February	.....	23,420	53,011	97,947	123,065	126,459
March	.....	30,963	61,902	98,269	133,556	138,941
April	.....	34,070	61,436	97,575	130,229	133,011
May	.....	36,987	67,977	100,151	132,962	135,132
June	.....	36,739	68,489	108,767	134,531	131,888
July	.....	37,396	78,493	77,184	137,639	138,170
August	.....	43,996	84,802	142,362	131,089	131,797
September	.....	42,372	85,536	110,908	132,464	132,996
October	.....	45,845	87,763	135,707	135,882	137,829
November	17,182	42,747	95,401	128,846	133,547	132,525
December	19,979	50,961	86,313	130,516	136,131	127,297
Total	37,161	447,473	882,392	1,331,092	1,587,212	1,603,414

	Bbls.
1920	37,161
1921	447,473
1922	882,392
1923	1,331,092
1924	1,587,212
1925	1,603,414
Grand total from November, 1920, to December 1925, inclusive	5,888,744

PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY

First Quarter, 1922

COUNTY	January Barrels	January Value	February Barrels	February Value	March Barrels	March Value
Allen	39,078.58	$64,111.38	40,537.98	$64,234.97	45,607.74	$72,195.58
Barren	3,487.22	6,805.83	5,413.22	10,082.13	3,447.00	6,493.64
Bath	1,481.27	1,481.27	1,311.14	1,311.14	1,985.26	1,985.26
Boyd	.....	.....	250.16	528.81	154.20	331.53
Estill	53,786.44	107,343.09	60,116.98	118,267.56	68,410.82	134,763.99
Floyd	331.99	667.03	206.02	391.44	559.96	1,099.17
Jackson	.....	.....	167.43	318.12	328.02	623.24
Johnson	39,713.30	84,937.11	40,916.23	87,606.38	50,050.06	107,280.14
Knott	169.01	321.12	397.05	796.40	171.96	326.72
Lawrence	29,887.76	64,073.69	29,160.16	62,409.84	29,418.88	63,036.39
Lee	297,927.91	659,163.80	286,994.01	618,559.42	308,788.74	665,351.00
Logan	.....	.....	449.67	822.59	.....	.....
Magoffin	79,302.67	166,135.16	82,886.02	173,363.25	93,204.73	195,792.33
Menifee	1,592.94	3,026.59	1,379.06	2,620.21	1,500.96	2,851.82
Morgan	636.93	1,265.91	1,211.07	2,445.29	1,180.41	2,350.66
McCreary	525.02	997.54	403.01	765.72	765.02	1,453.54
Powell	15,316.29	32,161.89	17,877.73	37,100.81	18,155.11	37,798.04
Simpson	.....	.....	6,910.53	13,105.05	6,500.00	12,350.00
Warren	106,148.71	188,887.87	100,636.07	174,047.39	103,240.81	179,322.81
Wayne	18,382.36	39,014.13	15,892.23	33,900.54	18,522.38	39,308.38
Wolfe	7,253.70	15,180.22	7,005.12	1,417,429.55	8,626.22	18,144.64
Totals	695,022.10	$1,435,573.63	700,120.89	$14,752.49	760,618.28	$1,542,858.88

PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY—Continued.
Second Quarter, 1922

COUNTY	April Barrels	April Value	May Barrels	May Value	June Barrels	June Value
Allen	46,871.28	$74,227.22	49,555.74	$78,490.65	54,881.63	$99,313.94
Barren	5,118.51	9,595.72	6,477.83	12,307.87	5,631.93	11,955.84
Bath	959.35	959.35	1,738.57	2,173.21	1,410.51	1,763.14
Boyd	.....	.....	130.44	313.06	212.98	511.15
Cumberland	.....	.....	1,065.59	2,135.60	605.97	1,348.61
Estill	65,526.94	129,393.92	69,756.76	152,240.44	62,092.38	137,835.09
Floyd	305.96	613.57	709.31	1,560.51	748.95	1,610.24
Jackson	20.54	39.03	479.12	1,030.11	166.98	359.01
Johnson	47,379.54	101,530.77	53,457.29	127,730.89	53,068.97	126,906.55
Knott	229.97	436.94	410.84	924.19	281.98	606.26
Lawrence	30,084.08	64,434.28	32,413.20	77,340.32	30,860.30	73,661.25
Lee	291,362.15	627,730.63	312,893.05	690,715.23	291,806.89	627,416.30
Lincoln	116.16	116.16	250.00	500.00	.....	.....
Logan	.....	.....	458.64	825.55	288.06	590.53
Magoffin	91,280.46	191,647.79	104,859.70	246,887.77	103,557.52	243,903.01
Menifee	877.94	1,688.09	1,509.40	3,245.21	917.94	1,973.57
Morgan	911.93	1,843.42	1,212.10	2,786.26	951.94	2,206.41
McCreary	213.97	406.54	827.25	1,985.40	289.98	623.46
Powell	15,158.05	31,585.01	17,806.97	40,214.91	16,631.16	38,773.67
Russell	53.37	113.76	293.70	517.86	101.91	191.69
Simpson	4,067.29	7,727.85	7,443.42	14,114.81	7,562.79	16,146.11
Warren	101,788.85	179,296.53	107,730.74	189,846.94	96,883.30	193,867.17
Wayne	15,816.33	33,446.38	17,572.87	41,556.99	15,518.25	36,720.61
Whitley	.....	.....	149.75	321.96	.....	.....
Wolfe	7,726.73	16,309.99	8,413.16	19,774.98	7,614.79	17,933.78
Totals	724,958.47	$1,473,142.95	797,615.44	$1,709,540.72	752,087.11	$1,636,217.39

PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY—Continued.
Third Quarter, 1922

COUNTY	July Barrels	July Value	August Barrels	August Value	September Barrels	September Value
Allen	67,191.35	$107,703.86	75,431.99	$100,360.46	65,799.67	$87,562.10
Barren	8,491.17	16,267.36	8,139.86	13,319.23	5,041.48	8,148.77
Bath	1,581.39	1,581.39	1,247.69	1,247.69	1,562.45	1,562.45
Boyd	.....	.....	86.44	164.24	214.54	403.84
Cumberland	129.54	307.79	676.85	1,294.51	409.21	679.98
Estill	61,844.77	108,793.28	64,719.24	111,434.63	58,782.47	101,115.80
Floyd	338.46	593.22	269.78	481.49	551.89	928.87
Jackson	170.46	281.26	442.38	729.93	.....	.....
Johnson	60,774.94	115,062.77	63,966.95	120,975.34	63,842.50	120,598.30
Knott	330.28	586.18	295.28	487.21	170.32	281.03
Lawrence	33,638.71	63,475.18	36,336.86	68,522.18	35,108.35	66,284.75
Lee	285,734.39	616,982.40	276,772.50	543,179.00	180,265.47	351,142.91
Lincoln	100.70	100.70	105.57	105.57	106.71	106.71
Logan	77.86	159.82	152.66	236.62	206.56	320.17
Magoffin	110.280.32	204,695.14	119,772.82	223,693.62	114,583.61	213,987.07
Menifee	924.40	1,525.26	1,123.44	1,853.68	960.80	1,585.32
Morgan	871.54	1,609.57	1,026.79	1.841.56	695.88	1,274.45
McCreary	740.44	1,221.73	416.46	687.16	646.86	1,067.32
Powell	16,829.14	32,121.59	17,539.98	32,517.39	16,058.81	29,697.14
Russell	365.72	868.95	263.48	495.60	116.64	219.40
Simpson	3,043.46	6,057.23	4,504.44	7,278.30	2,830.29	4,627.93
Warren	94,473.42	167.402.00	97,699.84	147,065.94	80,228.77	120,939.60
Wayne	15,286.86	28,674.53	14,909.01	27,842.01	14,202.57	26,463.29
Whitley	.....	.....	.....	.....	115.50	190.58
Wolfe	7,682.56	14,200.76	6,779.88	12,540.16	6,083.49	11,256.91
Totals	770,901.88	$1,490,271.97	792,590.19	$1,418,353.52	648,584.84	$1,150,444.69

PRODUCTION REPORT OF CRUDE PETROLEUM IN KENTUCKY—Continued.

Fourth Quarter, 1922

COUNTY	October Barrels	October Value	November Barrels	November Value	December Barrels	December Value
Allen	62,528.80	$87,947.23	48.642.25	$67,635.42	45,429.22	$69,228.31
Barren	4,288.12	7,232.12	3,829.43	6 467.68	5,981.63	10,157.95
Bath	1,209.07	1,209.07	866.42	866.42	2,268.95	2,268.95
Boyd	.....	.....	114.78	220.63	88.44	195.45
Cumberland	925.55	1,786.39	867.17	1,699.65	2,394.54	4,685.25
Estill	60,986.76	108,483.58	55,161.49	98,350.87	48,207.75	96.208.22
Floyd	145.80	267.02	362.29	656.27	303.46	627.15
Jackson	346.92	593.23	177.12	302.88	.....	.....
Johnson	61,322.26	119.476.35	68,895.07	134,299.47	63,370.65	139,467.40
Knott	316.67	584.66	170.20	291.04	168.97	331.18
Lawrence	40,782.00	79,355.25	38,937.21	75.773.83	35,568.00	78.153.35
Lee	370,156.48	727,168.32	261,559.05	509,664.30	265,389.58	534,672.37
Lincoln	98.87	98.87	104.64	104.64	.....	.....
Logan	74.18	114.98	141.61	219.49	.....	.....
Magoffin	118,244.29	228,276.03	118,710.00	229 348.94	97,690.57	212,960.95
Menifee	828.92	1,417.45	760.46	1,300.39	920.93	1,805.02
Morgan	1,193.58	2 212.41	554.36	1,036.95	679.38	1,427.68
McCreary	623.08	1,065.47	485.48	830.17	462.96	907.40
Ohio	.....	.....	.....	.....	257.08	445.37
Powell	19,753.18	37,506.39	18,825.58	35.856.83	16,468.40	34,028.21
Russell	89.71	168.75	152.41	289.58	359.77	631.37
Simpson	3,380.92	5,735.72	426.18	667.10	2,637.60	5,512.73
Warren	84,124.65	132,429.81	39,736.41	57,980.62	104,801.93	173,500.44
Wayne	14,956.60	28,798.77	14.652.93	28,225.90	13,379.77	29,057.37
Whitley	.....	.....	.....	.....	.....	.....
Wolfe	7,119.28	13,659.77	6,998.15	13,389.00	5,348.39	11,595.21
Totals	853.495.69	$1,585,587.64	681,130.69	$1,265.478.07	712,177.97	$1,407,867.33

Petroleum Production in Eastern Kentucky.

There is given herewith in Table I statistics of petroleum production for Eastern Kentucky. The figures represent oil runs of all agencies. The arrangement is according to pools with grand monthly totals. In Table II which follows there is presented statistics of monthly oil runs of the Cumberland Pipe Line Company alone by districts for Eastern Kentucky.

OIL RUNS

TABLE I.

	McKinney	Oil Springs and Magoffin	Torrent and Big Sinking	Isonville	Ida May	Bolts Fork	Buffalo	Totals	
1920—									
November	95	16,468	429,222					625,521	
December	83	18,437	449,202					659,685	7,485,966
1921—									
January	94	23,901	430.000					689,889	
February		27,375	387,000					607,190	
March		39,414	403,267					653,544	
April		41,491	378,856					620,760	
May		55,171	416,422					672,594	
June		56,517	339,912					568,483	
July		58.255	359,245					578,289	
August		75,373	377,517					652,558	
September		73,301	334,641						
October		78,372	328,646						
November		80,283	321,023					563,734	
December		89,332	319,153					586,984	7,350,480

TABLE I—Continued.

1922—									
January		87,824	314,372					557,205	
February		89,844	297,645					551,861	
March		101,107	323,617					611,126	
April	116	98,252	300,881					573,119	
May		111,629	317,473					623,557	
June		109,776	296,182					585,798	
July	101	116,996	289,429					596,673	
August	106	125,293	278,640					604,844	
September	107	120.153	275,325					587,253	
October	99	122,814	279,407					604,609	
November	105	123,163	264,750					586,914	
December		102,347	267,771					550,845	7,033,804
1923—									
January		137,062	267,831					614,564	
February		116,937	223,506					522,005	
March	102	104,887	253,615					556,058	
April	117	114.965	233,479					546,396	
May		106,097	235,540					533,659	
June	76	124,235	235,667					568,901	
July	156	81,427	225,177					478,337	
August		141,154	215,925					622,296	
September	47	137,763	206,123					556.131	
October		116,623	212,883					574,668	
November		110.676	193,094					526,463	
December		104,889	196,592					525,262	6,624,740
1924—									
January		106,728	182,231	741		142		493,712	
February		98,038	177,292	495	180	85		488,275	

TABLE I—Continued.

	McKinney	Oil Springs and Magoffin	Torrent and Big Sinking	Isonville	Ida May	Bolts Fork	Buffalo	Totals	
March		97,323	185,260	664	2,222			513,821	
April		97,499	182,302	736	7,785	218		511,332	
May		98,135	184,376	533	20,291	86		532,578	
June		90,264	168,860	440	25,933	142		508,412	
July		99,868	186,948	789	28,199			548,853	
August	106	86,725	169,602	533	20,135	196		494,227	
September	8	89,534	170,083	509	24,135	197		506,863	
October		94,435	169,607	885	23,928			516,449	
November		81,638	151,702	438	16,392	181		461,853	
December		85,682	158,092	508	18,367		186	471,022	6,047,397
1925—									
January	50	82,387	154,291	809	14,254		325	468,357	
February		74,634	143,676	529	11,397	127	247	432,585	
March		82,330	153,852	807	11,921	146	639	470,457	
April		78,301	143,350	790	11,646		336	449,220	
May		74,374	144,553	660	11,612	275	397	452,109	
June		72,872	141,220	715	9,939		559	432,787	
July		79,994	145,606	253	8,847		322	458,939	
August		70,178	139,551	955	9,106	149	499	428,224	
September		75,206	134,626	1,043	8,250		600	429,652	
October		71,699	134,541	418	7,963	211	382	427,444	
November		68,143	129,126	706	6,897		552	408,845	
December		73,554	124,990	548	7,472	85		400,800	5,259,419

TABLE I—Continued.

	Wayne County	Lawrence, Busseyville & Fallsburg	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
1920—						
November	20,749	10,083	1,014	60,417	1,933	144
December	25,819	12,093	1,032	68,312	1,712	857
1921—						
January	30,454	10,536	1,764	107,540	1,827	259
February	32,964	11,115	1,139	64,747	1,634	276
March	41,396	12,116	1,186	62,787	1,641	772
April	38,544	11,585	1,131	63,011	1,502	869
May	35,996	10,716	1,199	58,799	1,867	504
June	32,368	10,335	525	49,160	936	693
July	24,074	11,496	458	47,031	1,269	368
August	27,826	11,711	1,175	66,680	2,052	872
September	24,494	11,549	1,576	53,085	1,583	594
October	24,257	9,807	931	49,126	1,657	649
November	20,652	11,006	694	50,259	1,348	491
December	19,479	11,571	1,164	50,961	1,606	418
1922—						
January	18,456	9,900	1,089	40,506	1,066	502
February	15,948	10,358	1,847	47,399	1,088	604
March	18,933	9,822	1,780	53,705	1,688	732
April	15,760	9.055	1,236	48,473	2,060	536
May	18,046	11,316	1,677	52,955	2,168	1,120

TABLE I—Continued.

	Wayne County	Lawrence, Busseyville & Fallsburg	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
June	15,471	9,529	1,311	46,214	1,428	1,029
July	15,949	9,297	1,312	46,004	1,957	668
August	14,897	10,072	1,282	51,347	1,357	562
September	14,578	8,148	1,206	46,489	1,089	723
October	15,143	9,831	1,554	46,626	1,353	464
November	14,702	8,288	749	40,718	1,427	533
December	13,383	9,043	864	35,857	989	474
1923—						
January	12,354	8,331	1,734	44,262	1,176	736
February	12,249	7,349	970	28,848	1,104	441
March	12,296	8,983	1,153	38,037	1,350	553
April	13,833	8,504	1,309	37,995	983	602
May	11,975	7,498	793	29,686	1,429	688
June	9,093	8,972	1,063	38,607	1,874	592
July	9,001	4,709	897	34,509	1,578	367
August	15,558	10,810	854	46,565	1,624	940
September	13,202	7,468	1,267	37,341	1,233	928
October	11,996	9,082	1,079	41,351	1,434	958
November	10,358	6,795	714	34,141	1,583	947
December	10,087	8,017	1,040	34,098	1,458	724
1924—						
January	9,770	7,610	809	23,842	1,090	1,030
February	10,761	6,899	967	31,447	1,445	1,122

TABLE I—Continued.

	Wayne County	Lawrence, Busseyville & Fallsburg	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
March	11,167	7,582	1,164	25,031	1,208	1,730
April	10,302	7,463	1,287	36,083	1,230	1,759
May	12,564	6,866	732	36,124	1,419	1,154
June	11,242	6,687	1,183	33,604	1,246	2,612
July	11,674	7,976	1,245	32,007	1,977	1,193
August	9,443	6,280	988	34,809	2,379	1,136
September	10,855	7,067	1,242	34,792	2,131	1,401
October	10,009	6,784	990	38,035	2,314	1,615
November	8,267	5,814	973	31,453	1,985	1,043
December	9,769	6,120	1,334	24,623	2,017	1,257
1925—						
January	10,424	6,679	561	32,001	2,388	938
February	9,573	5,945	729	28,914	2,357	1,122
March	12,420	6,239	541	32,704	2,340	491
April	11,581	6,827	931	32,709	2,190	1,130
May	12,880	7,295	571	33,160	2,410	1,008
June	13,166	6,124	653	27,213	2,380	388
July	11,899	6,723	619	35,780	2,273	1,302
August	12,096	5,579	711	30,505	1,926	342
September	10,972	6,471	587	29,001	1,959	717
October	11,311	5,716	640	29,117	2,129	1,576
November	9,901	5,341	761	28,540	1,666	676
December	11,999	5,158	676	22,857	1,772	825

TABLE I—Continued.

	Ragland	Wagersville	Ashley	Ross Creek	Martha District	Menifee County
1920—						
November	1,281	1,653	48,985	6,106	17,182	10,189
December	1,659	1,838	45,704	5,148	19,979	7,810
1921—						
January	1,488	1,889	45,000	5,373	21,977	7,787
February	854	963	43,000	5,711	23,420	6,992
March	2,192	1,783	43,525	5,189	30,963	7,311
April	983	620	38,004	4,871	34,070	5,223
May	1,849	1,344	41,705	4,664	36,987	5,371
June	1,500	643	34,376	3,036	36,739	1,743
July	1,533	373	29,152	3,781	37,396	3,858
August	1,503	166	35,810	4,447	43,996	3,460
September	1,030	157	28,138	5,180	42,372	1,978
October	1,684	107	28,836	3,820	45,845	3,040
November	166	310	28,713	4,395	42,747	1,647
December	2,386	528	32,500	4,948	50,961	1,977
1922—						
January	1,481	137	24,818	4,191	51,269	1,594
February	1,311	167	27,112	4,209	53,011	1,318
March	1,985	611	28,678	4,665	61,902	1,901
April	959	1,069	26,003	6,406	61,436	877
May	1,739	1,848	29,221	4,882	67,977	1,506

TABLE I—Continued.

	Ragland	Wagersville	Ashley	Ross Creek	Martha District	Menifee County
June	1,411	797	27,546	5,698	68,489	917
July	1,581	1,245	27,364	5,362	78,493	915
August	1,248	1,156	26,940	6,020	84,802	1,122
September	1,562	794	26,667	3,975	85,536	961
October	1,209	1,354	30,838	5,315	87,763	839
November	866	1,453	29,275	4,722	95,401	762
December	2,269	811	26,319	3,486	86,313	919
1923—						
January	1,323	81	31,752	4,426	102,860	636
February	1,450	590	25,504	4,652	97,947	458
March	892	832	29,412	5,147	98,269	530
April	1,618	801	29,406	5,074	97,575	135
May	2,266	944	32,705	3,887	100,151	
June	615	293	33,861	4,421	108,767	765
July	1,941	802	35,535	4,963	77,184	91
August	1,973	433	38,662	3,799	142,362	1,637
September	1,784	370	33,105	4,341	110,908	251
October	1,111	555	37,787	4,017	135,707	85
November	747	161	33,362	4,240	128,846	799
December	1,411	252	33,118	2,771	130,516	289
1924—						
January	2,149		28,382	2,989	126,116	83
February	724	287	31,423	3.699	123,065	346

TABLE I—Continued.

	Ragland	Wagersville	Ashley	Ross Creek	Martha District	Menifee County
March	1,592	298	42,303	2,721	133,556	
April	1,420	562	29,382	2,219	130,299	786
May	2,137	503	31,809	2,627	132,963	259
June	965	191	28,287	2,226	134,531	
July	1,560	846	33,785	2,744	137,639	403
August	2,049	133	26,954	1,670	131,089	
September	999	77	28,615	2,350	132,464	404
October	798	469	27,881	2,562	135,882	255
November	1,936	504	24,550	1,430	133,547	
December	1,358		23,512	1,585	136,131	481
1925—						
January	1,446	63	23,047	1,325	137,369	
February	1,479	428	23,309	1.380	126,459	280
March	1,417	75	24,040	1,553	138,942	
April	1,572	200	22,799	1,450	133,011	397
May	1,423	652	23,831	1,601	135,134	273
June	753	260	23,453	1,204	131,888	
July	2,033	714	22,244	1,812	138,171	347
August	1,062	448	22,168	1,151	131,798	
September	1,333	575	23,095	1,984	132,996	237
October	838	759	20,823	1,371	137,829	121
November	1,625	397	20,584	1,268	132,525	137
December	1,824	884	19,589	1,125	127,297	145

TABLE II—OIL RUNS

	Menifee	McKinney	Oil Springs	Isonville	Ida May	Bolts Fork	Buffalo	
1920—								
November	10,189	95	16,468					
December	7,810	83	18,437					
1921—								
January	7,787	94	23,901					
February	6,992		27,375					
March	7,311		39,413					
April	5,223		41,491					
May	5,371		55,171					
June	1,743		56,517					
July	3,658		58,255			836		
August	3,460		75,373			81		
September	1,978		73,301			305		
October	3,040		78,372					
November	1,647		80,283					
December	1,977		89,332					
1922—								
January	1,594		87,824					
February	1,378		89,844					
March	1,901		101,107					
April	877	116	98,252					
May	1,560		111,629					

TABLE II—OIL RUNS—Continued.

	Menifee	McKinney	Oil Springs	Isonville	Ida May	Bolts Fork	Buffalo	
June	917		109,776					
July	925	101	116,996					
August	1,122	106	125,293					
September	961	107	120,153					
October	829	99	122,814					
November	762	105	123,163					
December	919		102,347					
1923—								
January	636		137,062					
February	458		116,937					
March	530	102	104,887					
April	135	117	114,965					
May			106,097					
June	765	76	124,235					
July	91	156	81,427					
August	1,637		141,154					
September	251	47	137,763					
October	85		116,623					
November	799		110,676					
December	289		104,889					
1924—								
January	83		106,728	741		142		
February	346		98,038	495	180	85		

TABLE II—OIL RUNS—Continued.

	Menifee	McKinney	Oil Springs	Isonville	Ida May	Bolts Fork	Buffalo	
March			97,323	664	2,222			
April	786		97,499	736	7,785	218		
May	259		98,135	533	17,291	86		
June			90,264	440	13,433	142		
July	403		99,868	789	14,199			
August		106	86,725	533	13,135	196		
September	404	8	89,534	509	13,135	197		
October	255		94,435	885	12,928			
November			81,638	438	10,392	181		
December	481		85,682	508	10,367		186	4,205,877
1925—								
January		50	82,387	809	8,852		325	
February	280		74,634	529	7,159	127	247	
March			82,330	807	7,689	146	639	
April	397		78,301	790	7,746		336	
May	273		74,374	660	8,331	275	397	
June			72,872	715	6,875		559	
July	347		79,994	253	5,623		322	
August			70,178	955	6,281	149	499	
September	237		75,206	1,043	5,622		600	
October	121		71,699	418	5,360	211	382	
November	137		68,143	706	4,767		552	
December	145		73,554	548	5,098	85		3,565,665

TABLE II—OIL RUNS—Continued.

	Wayne County	Lawrence County	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
1920—						
November	20,749	10,083	1,014	60,417	1,933	144
December	25,819	12,093	1,032	68,312	1,712	857
1921—						
January	30,454	10,536	1,764	107,540	1,827	259
February	32,964	11,114	1,139	64,747	1,634	276
March	41,395	12,116	1,186	62,787	1,641	772
April	38,544	11,585	1,131	60,311	1,502	869
May	35,996	10,716	1,199	58,799	1,867	504
June	32,368	10,335	525	49,160	936	693
July	24,074	11,497	458	47,031	1,269	368
August	27,826	11,711	1,175	66,680	2,052	872
September	24,495	11,549	1,576	53,085	1,583	594
October	24,267	9,807	1,583	49,126	1,006	649
November	20,651	11,006	1,354	50,259	688	491
December	19,479	11,738	1,559	50,961	1,211	419
1922—						
January	18,456	9,900	1,089	40,506	1,066	502
February	15,948	10,358	1,847	47,399	1,088	604
March	18,933	9,827	1,780	53,705	1,688	732
April	15,760	9,055	1,236	48,473	2,060	536
May	18,046	11,316	1,677	52,955	2,168	1,120

TABLE II—OIL RUNS—Continued.

	Wayne County	Lawrence County	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
June	15,471	9,529	1,311	46,214	1,428	1,029
July	15,949	9,297	1,312	46,004	1,957	668
August	14,897	10,072	1,282	51,347	1,357	562
September	14,518	8,148	1,206	46,489	1,089	723
October	15,143	9,831	1,554	46,626	1,353	464
November	14,702	8,288	749	40,718	1,427	533
December	13,383	9,043	864	35,857	989	474
1923—						
January	12,354	8,331	1,734	44,262	1,176	736
February	12,249	7,349	970	28,848	1,104	441
March	12,296	8,983	1,153	38,037	1,350	553
April	13,833	8,504	1,309	37,995	983	602
May	11,975	7,498	793	29,686	1,429	688
June	9,093	8,972	1,063	38,607	1,874	592
July	9,001	4,709	897	34,509	1,578	367
August	15,558	10,810	854	46,565	1,624	940
September	13,202	7,468	1,267	37,341	1,233	928
October	11,996	9,082	1,079	41,351	1,434	958
November	10,358	6,795	714	34,141	1,583	947
December	10,087	8,017	1,040	34,098	1,458	724
1924—						
January	9,770	7,610	809	23,842	1,090	1,030
February	10,761	6,899	967	37,145	1,445	1,122

TABLE II—OIL RUNS—Continued.

	Wayne County	Lawrence County	Morgan County	Cow Creek & Fitchburg	Campton & Stillwater	Beaver Creek
March	11,167	7,582	1,164	53,284	1,208	1,730
April	10,302	7,463	1,287	36,083	1,230	1,759
May	12,564	6,866	732	36,124	1,419	1,154
June	11,241	6,687	1,183	33,604	1,246	2,612
July	11,674	7,976	1,245	32,007	1,977	1,193
August	9,443	6,280	988	34,809	2,379	1,136
September	10,855	7,067	1,242	34,792	2,131	1,401
October	10,009	6,784	990	38,035	2,314	1,615
November	8,267	5,814	973	31,453	1,985	1,043
December	9,769	6,120	1,334	24,623	2,017	1,257
1925—						
January	10,171	6,679	561	32,001	2,388	938
February	9,338	5,945	729	28,914	2,357	1,122
March	12,175	6,239	541	32,704	2,340	491
April	11,342	6,827	931	32,709	2,190	1,130
May	12,650	7,295	571	33,160	2,410	1,008
June	12,947	6,124	653	27,213	2,380	388
July	11,692	6,723	619	35,780	2,273	1,302
August	11,888	5,579	711	30,505	1,926	342
September	10,739	6,471	587	29,001	1,959	717
October	11,065	5,716	640	29,117	2,129	1,576
November	9,672	5,341	761	28,540	1,666	676
December	11,769	5,158	676	22,857	1,772	825

TABLE II—OIL RUNS—Continued.

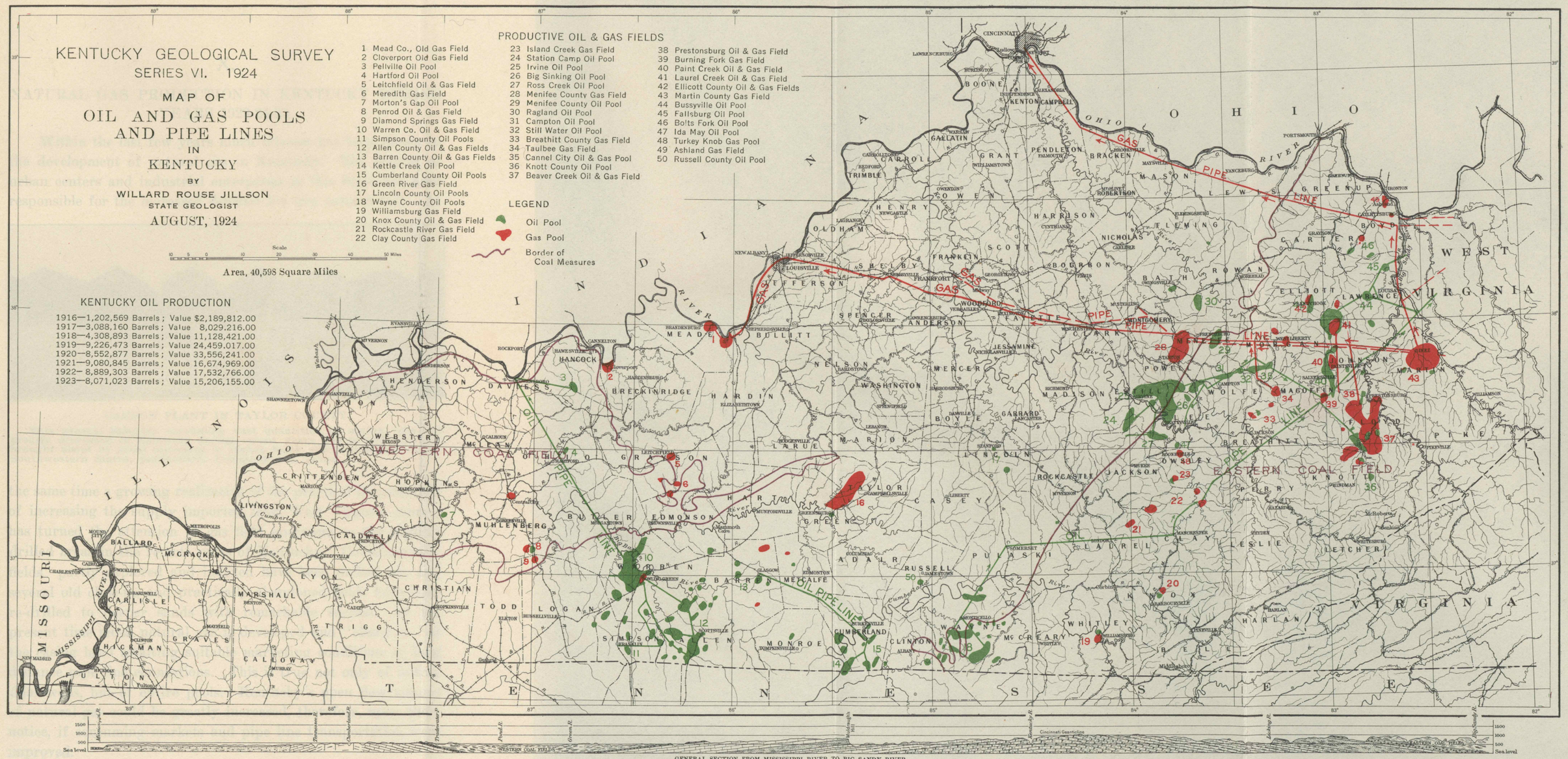
	Ragland	Wagersville	Ashley	Torrent and Lee Co.	Ross Creek	Martha District
1920—						
November	1,281	1,653	31,179	109,941	6,106	17,182
December	1,659	1,837	28,242	115,984	5,147	19,979
1921—						
January	2,977	1,889	60,783	176,766	5,373	21,977
February	854	963	62,579	194,694	5,711	23,420
March	2,192	1,785	32,467	142,266	5,189	30,962
April	983	620	25,166	103,088	4,871	34,070
May	1,848	1,344	26,752	107,838	4,664	36,987
June	1,500	643	22,831	93,379	3,036	36,739
July	1,533	373	14,756	93,020	3,781	37,396
August	1,503	166	20,723	92,421	4,447	43,996
September	1,030	157	14,833	82,415	5,180	42,372
October	1,684	107	15,115	79,482	3,820	45,835
November	166	310	14,136	75,581	4,394	42,747
December	2,386	528	17,993	79,384	4,948	50,951
1922—						
January	1,481	137	11,767	84,503	4,191	51,269
February	1,311	167	14,683	81,680	4,209	53,011
March	1,985	611	14,168	80,896	4,665	61,902
April	959	1,069	12,350	71,175	6,406	61,436
May	1,739	1,848	15,057	72,012	4,882	67,977

TABLE II—OIL RUNS—Continued.

	Ragland	Wagersville	Ashley	Torrent and Lee Co.	Ross Creek	Martha District
June	1,411	797	14,134	71,142	5,698	68,489
July	1,581	1,245	13,552	60,297	5,362	78,493
August	1,248	1,156	14,936	60,197	6,020	84,802
September	1,562	794	13,781	57,439	3,975	85,536
October	1,209	1,354	15,845	62,127	5,315	87,763
November	866	1,453	15,299	57,034	4,722	95,401
December	2,269	811	11,650	53,980	3,486	86,313
1923—						
January	1,323	81	16,996	59,381	4,426	102,860
February	1,450	590	13,084	50,866	4,652	97,947
March	892	832	14,350	55,101	5,147	98,269
April	1,618	801	14,971	53,420	5,074	97,575
May	2,266	944	16,787	49,313	3,887	100,151
June	615	293	18,591	50,524	4,421	108,767
July	1,941	802	20,662	51,422	4,963	77,184
August	1,973	433	22,259	47,028	3,799	142,362
September	1,784	370	20,511	49,335	4,341	110,908
October	1,111	555	22,371	53,365	4,017	135,707
November	747	161	19,562	48,605	4,240	128,846
December	1,411	252	19,340	49,436	2,771	130,516
1924—						
January	2,149		16,507	45,025	2,989	126,116
February		287	17,824	41,897	3,699	123,065

TABLE II—OIL RUNS—Continued.

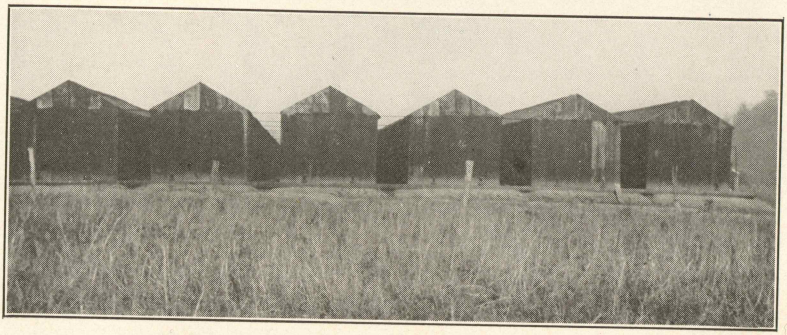
	Ragland	Wagersville	Ashley	Torrent and Lee Co.	Ross Creek	Martha District
March		298	27,931	51,596	2,721	133,556
April		562	16,175	42,486	2,219	130,299
May		503	17,523	43,827	2,627	132,963
June		191	14,426	39,930	2,226	134,531
July		846	18,740	41,291	2,744	137,639
August		133	9,660	34,935	1,670	131,089
September		77	11,282	36,310	2,350	132,464
October		469	10,102	36,109	2,562	135,882
November		504	9,207	30,655	1,430	133,547
December			8,668	33,698	1,585	136,131
1925—						
January		63	6,839	25,755	1,325	137,369
February		428	8,845	21,864	1,380	126,459
March		75	9,332	20,782	1,553	138,942
April		200	7,393	17,382	1,450	133,011
May		652	10,171	18,734	1,601	135,134
June		260	7,427	18,793	1,204	131,888
July		714	7,873	20,410	1,812	138,171
August		448	8,366	17,200	1,151	131,798
September		575	8,026	17,531	1,984	132,996
October		759	7,419	17,091	1,371	137,829
November		397	7,848	16,944	1,268	132,525
December		884	6,495	15,570	1,125	127,297


KENTUCKY GEOLOGICAL SURVEY
SERIES VI. 1924
MAP OF
OIL AND GAS POOLS
AND PIPE LINES
IN
KENTUCKY
BY
WILLARD ROUSE JILLSON
STATE GEOLOGIST
AUGUST, 1924
Scale
Area, 40,598 Square Miles
KENTUCKY OIL PRODUCTION
1916—1,202,569 Barrels ; Value $2,189,812.00
1917—3,088,160 Barrels ; Value 8,029.216.00
1918—4,308,893 Barrels ; Value 11,128,421.00
1919—9,226,473 Barrels ; Value 24,459.017.00
1920—8,552,877 Barrels ; Value 33,556,241.00
1921—9,080,845 Barrels ; Value 16,674,969.00
1922— 8,889,303 Barrels ; Value 17,532,766.00
1923—8,071,023 Barrels ; Value 15,206,155.00
PRODUCTIVE OIL & GAS FIELDS
1 Mead Co., Old Gas Field
2 Cloverport Old Gas Field
3 Pellville Oil Pool
4 Hartford Oil Pool
5 Leitchfield Oil & Gas Field
6 Meredith Gas Field
7 Morton's Gap Oil Pool
8 Penrod Oil & Gas Field
9 Diamond Springs Gas Field
10 Warren Co. Oil & Gas Field
11 Simpson County Oil Pools
12 Allen County Oil & Gas Fields
13 Barren County Oil & Gas Fields
14 Kettle Creek Oil Pool
15 Cumberland County Oil Pools
16 Green River Gas Field
17 Lincoln County Oil Pools
18 Wayne County Oil Pools
19 Williamsburg Gas Field
20 Knox County Oil & Gas Field
21 Rockcastle River Gas Field
22 Clay County Gas Field
23 Island Creek Gas Field
24 Station Camp Oil Pool
25 Irvine Oil Pool
26 Big Sinking Oil Pool
27 Ross Creek Oil Pool
28 Menifee County Gas Field
29 Menifee County Oil Pool
30 Ragland Oil Pool
31 Campton Oil Pool
32 Still Water Oil Pool
33 Breathitt County Gas Field
34 Taulbee Gas Field
35 Cannel City Oil & Gas Pool
36 Knott County Oil Pool
37 Beaver Creek Oil & Gas Field
38 Prestonsburg Oil & Gas Field
39 Burning Fork Gas Field
40 Paint Creek Oil & Gas Field
41 Laurel Creek Oil & Gas Field
42 Ellicott County Oil & Gas Fields
43 Martin County Gas Field
44 Bussyville Oil Pool
45 Fallsburg Oil Pool
46 Bolts Fork Oil Pool
47 Ida May Oil Pool
48 Turkey Knob Gas Pool
49 Ashland Gas Field
50 Russell County Oil Pool
LEGEND
Oil Pool
Gas Pool
Border of Coal Measures
WESTERN COAL FIELD
EASTERN COAL FIELD
OIL PIPE LINE
GAS PIPE LINE
OHIO
INDIANA
ILLINOIS
MISSOURI
WEST VIRGINIA
VIRGINIA
TENNESSEE
GENERAL SECTION FROM MISSISSIPPI RIVER TO BIG SANDY RIVER

X.

NATURAL GAS PRODUCTION IN KENTUCKY DURING YEARS 1923-24-25.

Within the last few years much interest has been shown in the development of natural gas in Kentucky. The growth of urban centers and industrial enterprises in this State has been responsible for the increased demand for this natural fuel. At



CARBON PLANT IN TAYLOR COUNTY

This general industry consuming vast quantities of natural gas has greatly decreased in Kentucky during recent years due to soft markets brought about by great increases in carbon black stocks produced in the Southwestern States, particularly Louisiana and Texas.

the same time a growing realization of the practical impossibility of increasing the supply imported from West Virginia sources has turned the attention of gas field operators to the slightly drilled areas in the remote parts of Kentucky. Co-incidentally fields partly explored and indexed have been drilled up, and several old close-in, and practically abandoned fields have been re-drilled to deeper sands with remarkable success. At the present time much natural gas is developed and "closed in" at the casing head awaiting suitable marketing conditions or long distance pipe line connections. This is true not only of individual wells, but of entire pools. Kentucky's open flow volume of natural gas could be greatly increased, therefore, upon short notice, if consuming markets and pipe line transportation were improved.

During the last year large corporate and individual producing interests serving public utility and industrial needs have taken up very extensive prospective oil and gas acreage in many parts of Kentucky, particularly the "Mountains of Eastern Kentucky." This farsighted movement entails a certain necessary amount of well distributed drilling exploration, which coupled with an intelligent use of the new county structural and geological oil and gas maps recently prepared by the Kentucky Geological Survey, and now available for all of the twenty-seven "Mountain" counties should lead to the discovery in the immediate future of greatly increased amounts of natural gas in this State.

An accurate survey of the natural gas fields of Kentucky has never been executed due to the very considerable cost connected with such a project. Furthermore it is doubtful whether the results obtained would justify the expenditure of either the time or money necessarily invested. In individual operations fluctuations of production are not uncommon caused by varying seasonal demand and a certainly diminishing pool supply in the "sands." Because of widespread successful exploratory and offset drilling, however, open flow volume for the entire State of Kentucky figured on a three year basis shows a steady actual increase. This increase is registered both in volume and value despite the fact that the carbon black industry has diminished very considerably during the same time. In the following tables the writer has attempted to present by way of personal estimate the recent productive status of the natural gas fields of Kentucky.

ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY DURING YEAR 1923

Public Utilities.

NAME	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Lou. Gas. & Elec. Co., (Floyd, Johnson and Magoffin Cos.)	2,000,000	10c	$200,000.00
Lou. Gas. & Elec. Co. (Meade Co.)	80,000	10c	8,000.00
Various Small Producers Throughout Kentucky. Public Utilities and Industrial Co.	1,000,000	10c	100,000.00

ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY DURING YEAR 1923

Public Utilities.

NAME	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Central Ky. Natural Gas. Co. (Johnson, Breathitt, Magoffin & Menifee Cos.)	2,000,000	10c	200,000.00
United Fuel Gas Co., Martin Co. (Lou. Gas. & Elec. Co., Pur.)	540,000	20c	108,000.00

Carbon Black Producers.

Eastern Carbon Co., Davis Bros. (Floyd and Knott Cos.)	2,500,000	5c	125,000.00
Midas Oil and Gas Co. (Floyd Co.)	2,400,000	5c	120,000.00
United Carbon Co. (Green and Taylor Cos.)	2,000,000	5c	100,000.00
Liberty Carbon Co. (Floyd Co.)	750,000	5c	37,500.00
Grand total volume in cubic feet	14,020,000	Grand total value	$1,036,000.00

ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY DURING YEAR 1924.

Public Utilities.

NAME	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Lou. Gas. & Elec. Co. (Floyd, Johnson and Magoffin Cos.)	1,800,00	10c	$180,000.00
Lou. Gas. & Elec. Co. (Meade Co.)	78,000	10c	7,800.00
Various Small Ky. Producers, Public Utilities and Industrial Cos.	1,500,000	10c	150,000.00
Central Ky. Natural Gas Co. (Johnson, Breathitt, Magoffin & Menifee Cos.)	2,300,000	10c	230,000.00
United Fuel Gas Co., Martin Co. (Lou. Gas. & Elec. Co., Pur.)	500,000	20c	100,000.00

Carbon Black Producers.

Eastern Carbon Co., Davis Bros. (Floyd and Knott Cos.)	2,200,000	5c	$110,000.00
Midas Oil and Gas Co. (Floyd Co.)	2,000,000	5c	100,000.00
United Carbon Co. (Green and Taylor Cos.)	1,300,000	5c	65,000.00
Liberty Carbon Co. (Floyd Co.)	900,000	5c	45,000.00
Petroleum Exploration Corp. (Owsley Co.)	400,000	5c	20,000.00
Grand total volume in cubic feet	12,978,000	Grand total value	$1,007,800.00

ESTIMATES OF NATURAL GAS PRODUCTION IN KENTUCKY DURING YEAR 1925

Public Utilities.

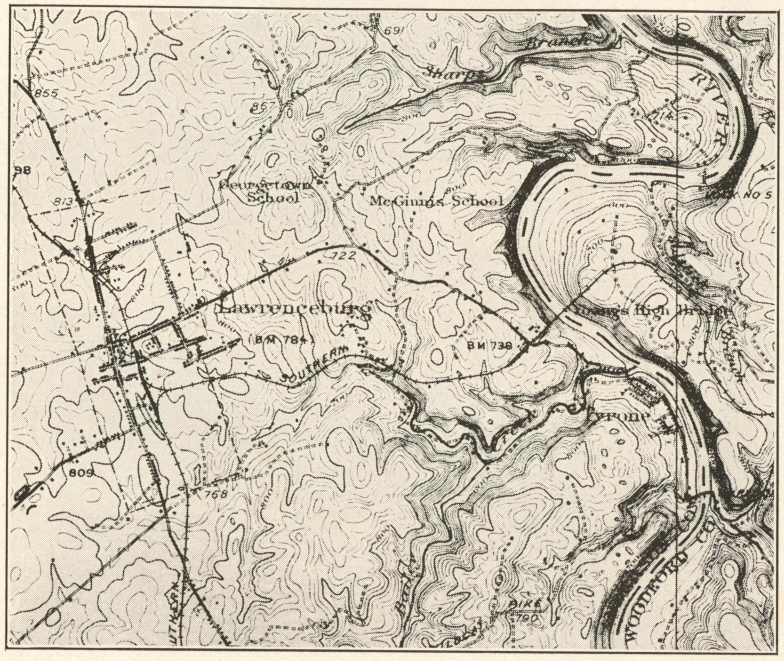
NAME	Volume in M. Cubic Feet	Rate Per M. Cu. Ft.	Total Value
Lou. Gas. & Elec. Co. (Floyd, Johnson and Magoffin Cos.)	1,600,000	10c	$160,000.00
Lou. Gas & Elec. Co. (Meade Co.)	75,000	10c	7,500.00
Small Kentucky Producers (L. G. & E. Co., Pur.)	2,000,000	12c	240,000.00
Fych Oil & Gas Co. (L. G. & E. Co., Pur.)	1,000,000	12c	120,000.00
Central Ky. Nat. Gas Co. (Johnson, Breathitt, Magoffin and Menifee Cos.)	1,000,000	10c	100,000.00
Small Producers (Central Ky., Purchase)	1,300,000	12c	156,000.00
United Fuel Gas Co., Martin Co. (L. G. & E. Co., Pur.)	350,000	21c	73,500.00
Small Utilities (Green, Taylor, Muhlenberg, Barren and Grayson Cos.)	1,000,000	10c	100,000.00
Amer. Rolling Mill Co. (Boyd Co.)	1,000,000	20c	200,000.00
Carbon Black Producers.			
Eastern Carbon Co., Davis Bros. (Floyd and Magoffin Cos.)	2,000,000	5c	100,000.00
Midas Oil & Gas Co. (Floyd Co.)	1,200,000	5c	60,000.00
Liberty Carbon Co. (Floyd Co.)	1,000,000	5c	50,000.00
United Carbon Co. (Green and Taylor Cos.)	750,000	5c	37,500.00
Grand total volume in cubic feet	14,275,000	Grand total value	$1,404,500.00

Manuscript written August 1926.

XI.

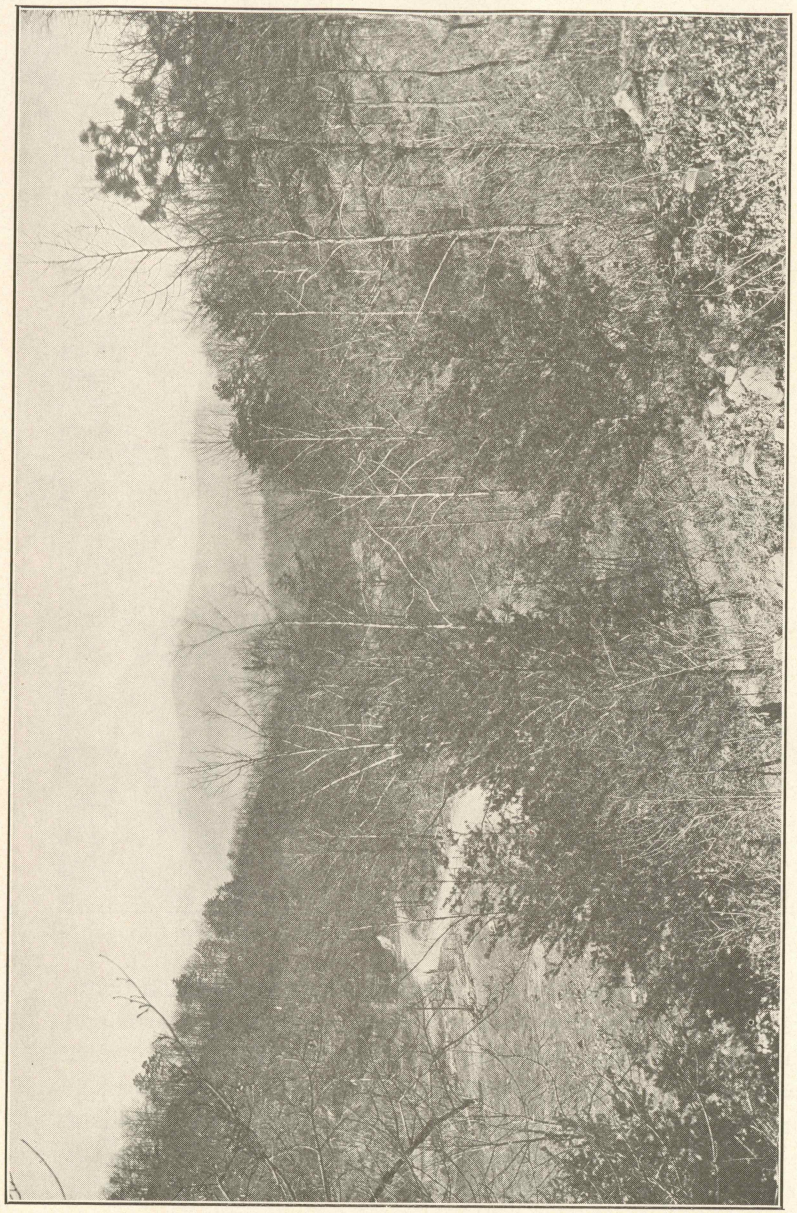
TOPOGRAPHIC BASE MAPPING IN KENTUCKY*

The progressive attitude of any State or minor political locality may be quickly interpreted by an inquiry as to the amount and kind of detailed base mapping within its boundaries. The wilderness was unmapped and unchartered and therefore presented obstacles to every early movement of men and commodities. These unknown obstacles in many cases were almost insurmountable. Civilization with its demand for agricultural, mineral and industrial development has long realized the necessity of accurate base maps, and since earliest time the attention of cartographers and engineers has been directed



Portion of new Frankfort Quadrange; Reduced.

* Revised reprint from "Bond Issue Campaign Book," Louisville, Ky., 1924.



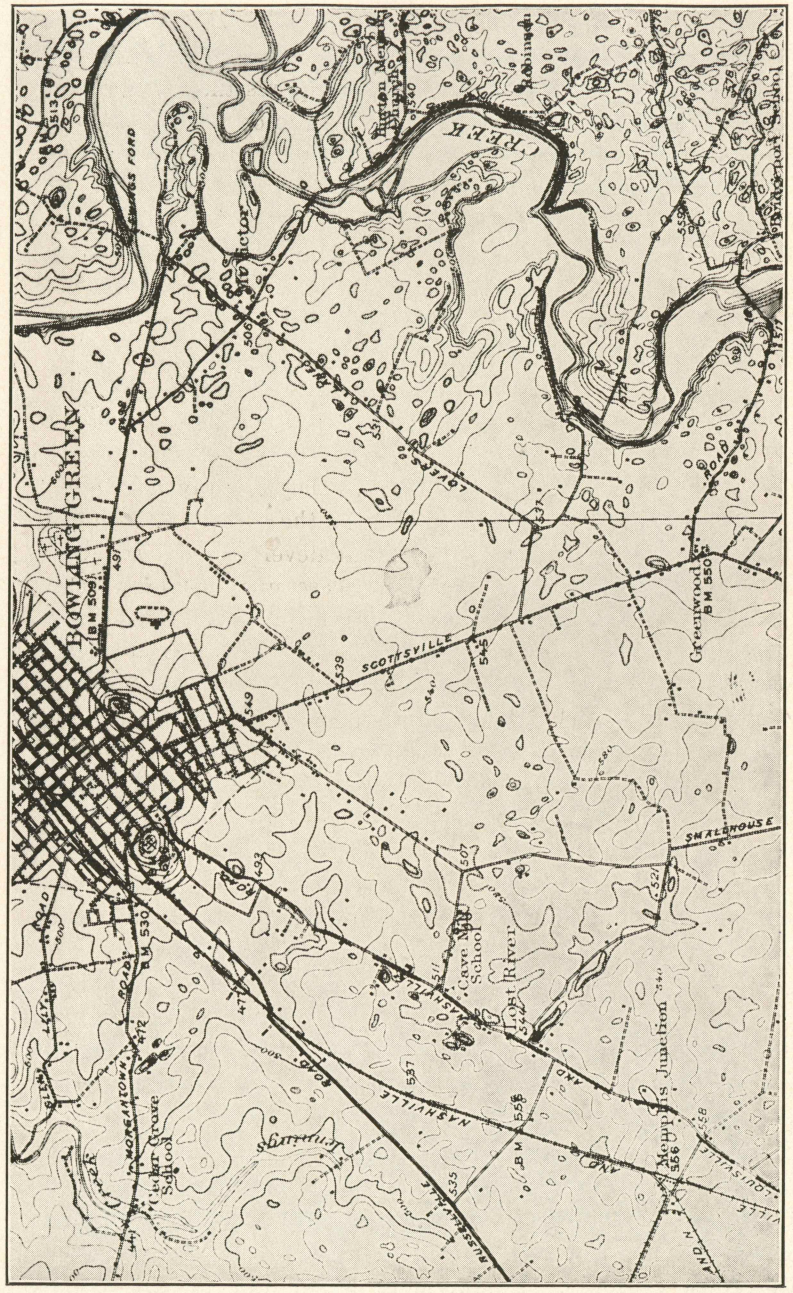
LOG MOUNTAINS, BELL COUNTY, KENTUCKY

The old Cumberland Gap sheet, scale 1:125,000, covers this portion of the Middlesboro basin. Mineral wealth here indicates the need of new topographic maps.

towards the improvement of detailed mapping of the subsurface of the earth. The degree of success which has attended efforts of this character is apparent when one compares the maps prepared in the day of Columbus or John Smith to one of the splendid copper engravings now prepared by the best processes of the United States government. Inaccuracy has given away to accuracy. Lack of detail has given way to extreme detail until today the United States Geological Survey's standard topographic map, scale 1:62,500 or about 1 inch to the mile, shows in addition to hills, streams and roads every important bit of culture and mineral development in the countryside.

These excellent maps are prepared in uniform size and are known as "fifteen minute quadrangles." They are about fourteen miles on an east and west line and eighteen miles on a north and south line. Prepared in colors they portray not only the physical appearance of that portion of the earth which they cover, but also show all of the important development wrought by man. They constitute an excellent base upon which highway surveys, land surveys, railroad surveys, agricultural surveys, soil surveys, mineral surveys, hydro-electric surveys, geological surveys, drainage surveys, forestry surveys, sanitary surveys, aerial routes, military routes, and artificial inland waterways may be outlined and constructed. The cost of the preparation of a topographic map is more than that of a simple road map because of the vast amount of important detail information placed upon it.

A topographic map shows, for instance, every road, lane, trail, bridge, tunnel, and house, as well as the cities and small towns in their fullest extent. Pipe line and railroad routes are accurately portrayed. The value in preparing such a kind of map is that it will serve excellently any purpose for which any kind of map is desired. On these maps the forested areas are shown in tints of green, areas of swamp by appropriate symbols; and every hill and valley or depression is portrayed by use of the continuous line of brown on which actually surveyed elevations are marked. By this method the elevation of any point within a topographically surveyed area can be known within a few feet dependent upon the interval between the brown contours. Furthermore metal and cement monu-

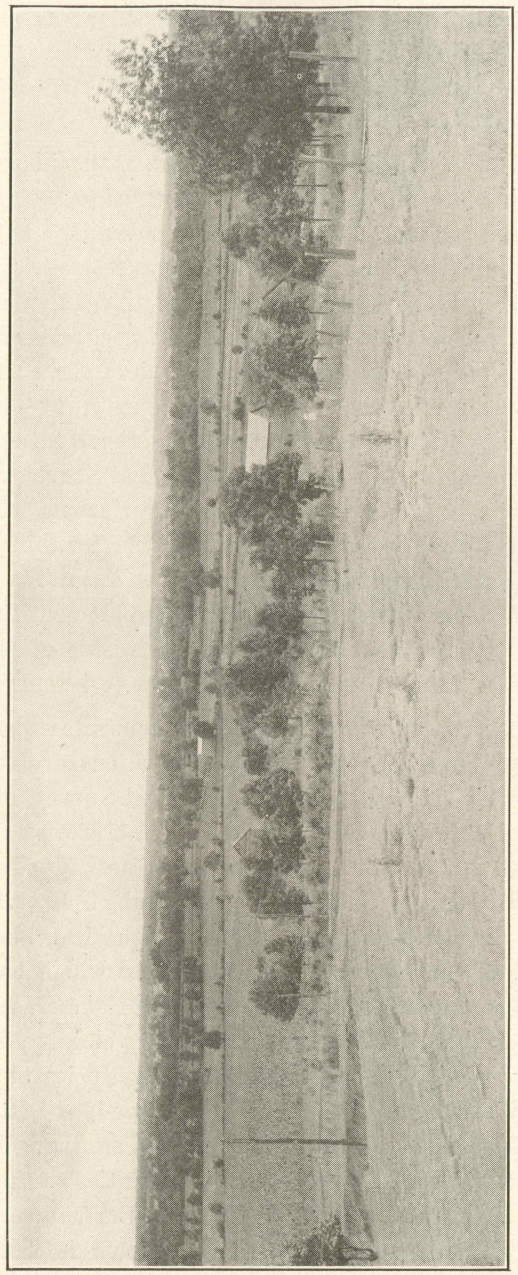


Portion of New Bowling Green Quadrangle: Reduced.

ments are established throughout all surveyed areas on which the absolute elevation of that particular point above sea level is inscribed for the free use of any and all who may desire this kind of information.

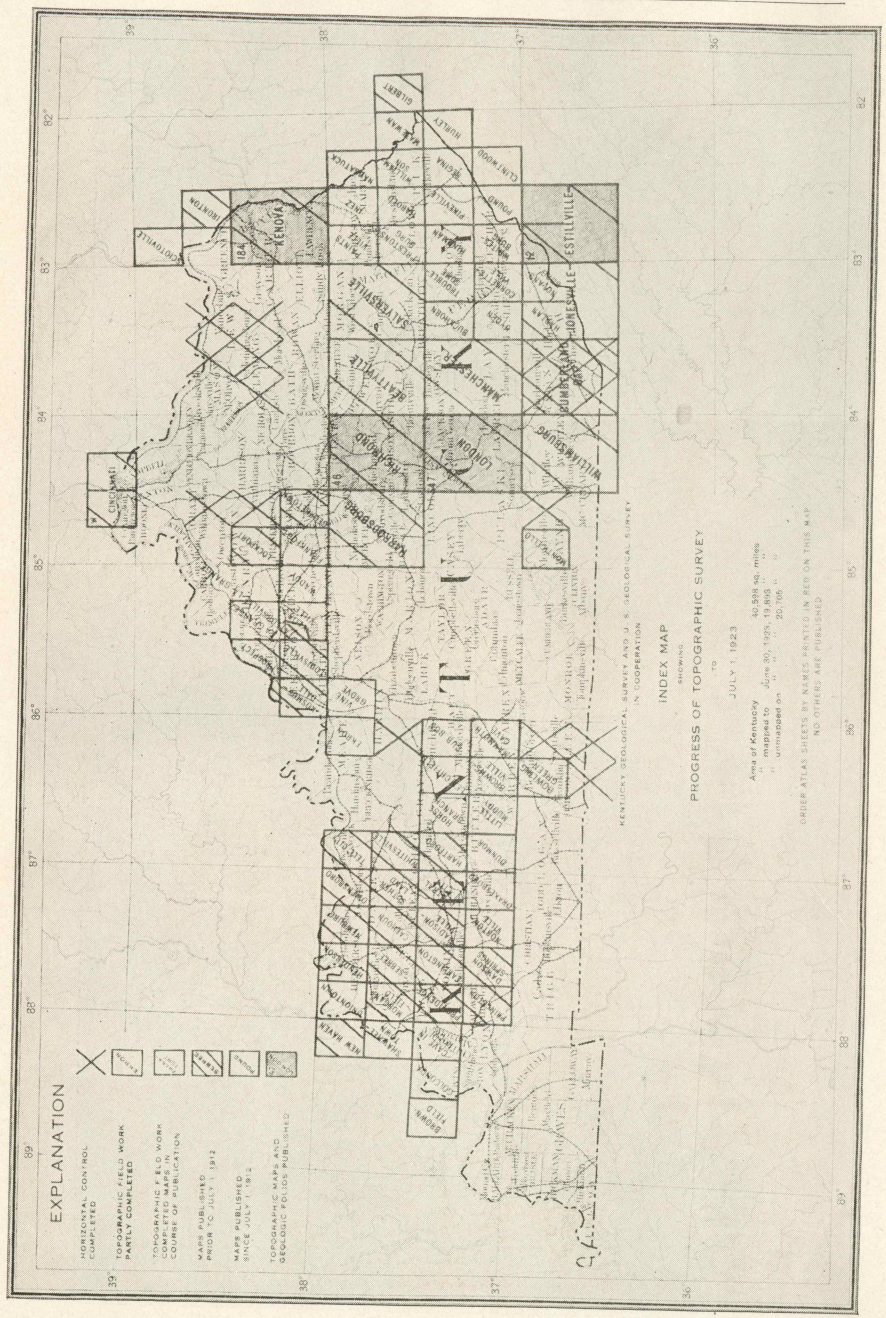
The need of accurate topographic base maps in the State of Kentucky has been realized for a number of years. Mineral operators including those interested in the development of the coal, oil, gas, building stones, fluorspar, clays and other mineral resources of this State have been insistent that these maps be prepared so that the State might have an accurate base map upon which to indicate the occurrence of each of these and other important mineral resources. The work of mapping this State has been carried forward co-operatively by the Kentucky Geological Survey and the United States Geological Survey upwards of twenty years, but with very small appropriations. Up until 1920 this State appropriated only $10,000 a year for this purpose. This fund was met by an equal appropriation from Washington through the U. S. Geological Survey, which department furnished the men and the instruments, while the Director of the Kentucky Geological Survey designated the areas to be surveyed.

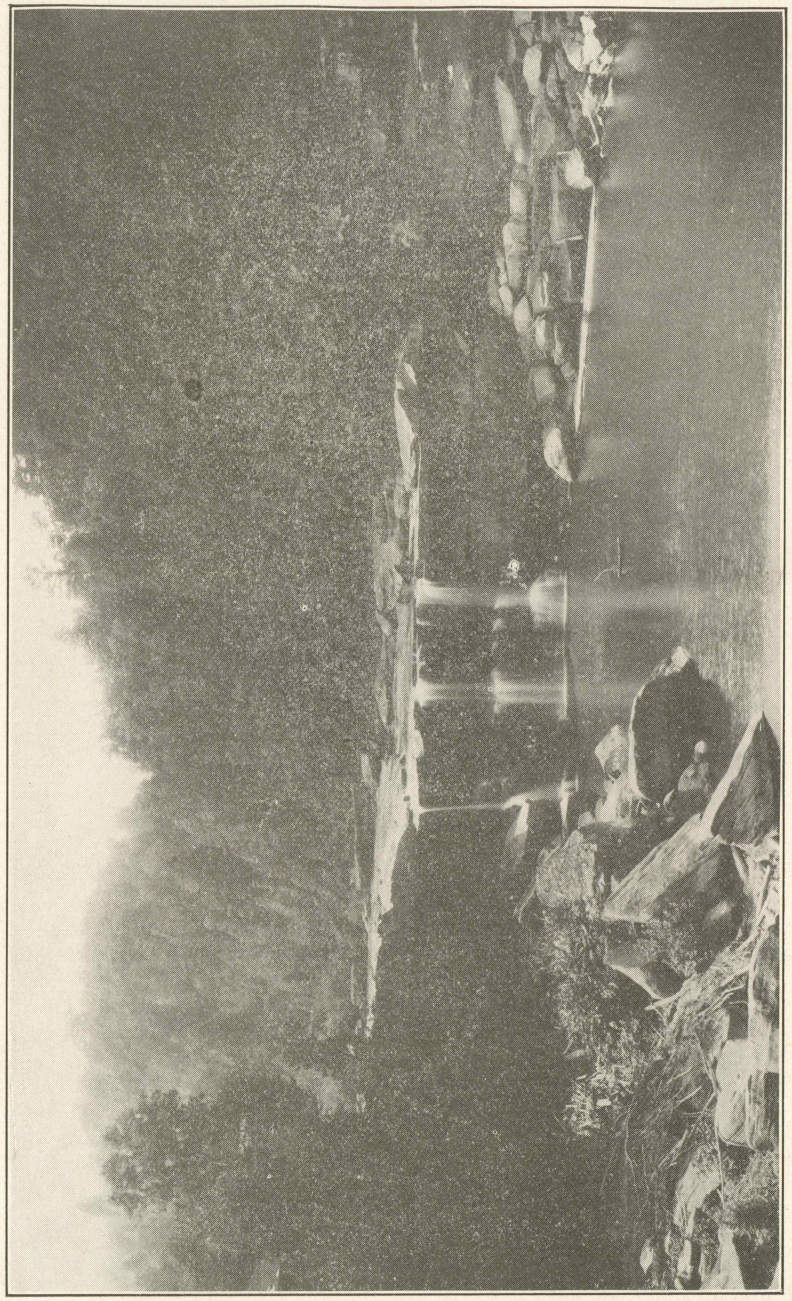
At the present time upwards of 76 separate topographic sheets or maps have been prepared for portions of Kentucky, and may be received from the State Geological Survey at Frankfort. The total area thus surveyed on July 1, 1925, was equivalent to 20,723 square miles, and the area unmapped on this date was 19,875 square miles; giving a total of 40,598 square miles, or the area of Kentucky. Broadly speaking, about one-half of Kentucky is now mapped. The areas which have been topographically mapped consist principally of the Eastern and Western coal fields together with certain areas closely adjoining. The territory from Olive Hill in Eastern Kentucky to Lexington, and north almost to Covington is unmapped, as is the broad region extending south of Louisville to the Tennessee line, and westward through Logan and Christian Counties to the Mississippi River. All of Central Kentucky from Bardstown to Somerset and to Tompkinsville back to Bardstown is unsurveyed topographically.



A PANORAMA NEAR BENTON, KENTUCKY

There are at present no topographic maps in all the Jackson Purchase region. Road building here demands detailed maps.

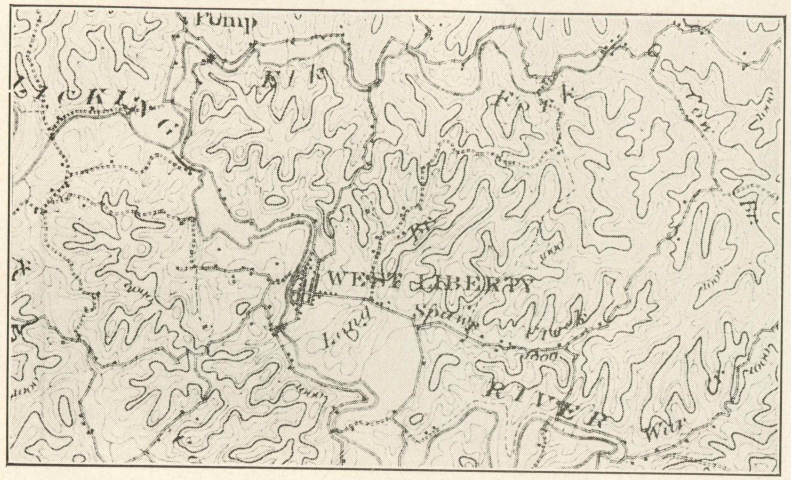

EXPLANATION
HORIZONTAL CONTROL COMPLETED
TOPOGRAPHIC FIELD WORK PARTLY COMPLETED
TOPOGRAPHIC FIELD WORK COMPLETED, MAPS IN COURSE OF PUBLICATION
MAPS PUBLISHED PRIOR TO JULY 1, 1912
MAPS PUBLISHED SINCE JULY 1, 1912
TOPOGRAPHIC MAPS AND GEOLOGIC FOLIOS PUBLISHED
KENTUCKY GEOLOGICAL SURVEY AND U. S. GEOLOGICAL SURVEY IN COOPERATION
INDEX MAP
SHOWING
PROGRESS OF TOPOGRAPHIC SURVEY
TO
JULY 1, 1923
Area of Kentucky 40,598 sq. miles
" " mapped on June 30, 1925, 19,893 " "
" " unmapped on " " " 20,705 " "
ORDER ATLAS SHEETS BY NAMES PRINTED IN RED ON THIS MAP
NO OTHERS ARE PUBLISHED
KENOVA
ESTILLVILLE
WILLIAMSBURG
LONDON
MANCHESTER
RICHMOND
MORGANSBURG
SALYERSVILLE
PAINTSVILLE
PIKEVILLE
BURGIN
FIELD
CLINTWOOD
MULLAY
GILBERT
NEW HAVEN
CINCINNATI
LEXINGTON
FRANKFORT
LOUISVILLE
PADUCAH
MAYFIELD
HOPKINSVILLE
BOWLING GREEN
CORBIN
MIDDLESBORO
PIKEVILLE
HAZARD
PRESTONSBURG
MOREHEAD
WINCHESTER
RICHMOND
LEXINGTON
FRANKFORT
LOUISVILLE
BARDSTOWN
ELIZABETHTOWN
BOWLING GREEN
HOPKINSVILLE
MAYFIELD
PADUCAH



CUMBERLAND FALLS

This important scenic area is shown on the old 1.125,000 scale, Williamsburg Quadrangle. Inaccuracies are very apparent on this old map and the region should be resurveyed to the scale 1.62,500 at once.

An index map showing the surveyed and unsurveyed regions in Kentucky is presented herewith and shows at a glance the contrast of surveyed and unsurveyed regions.

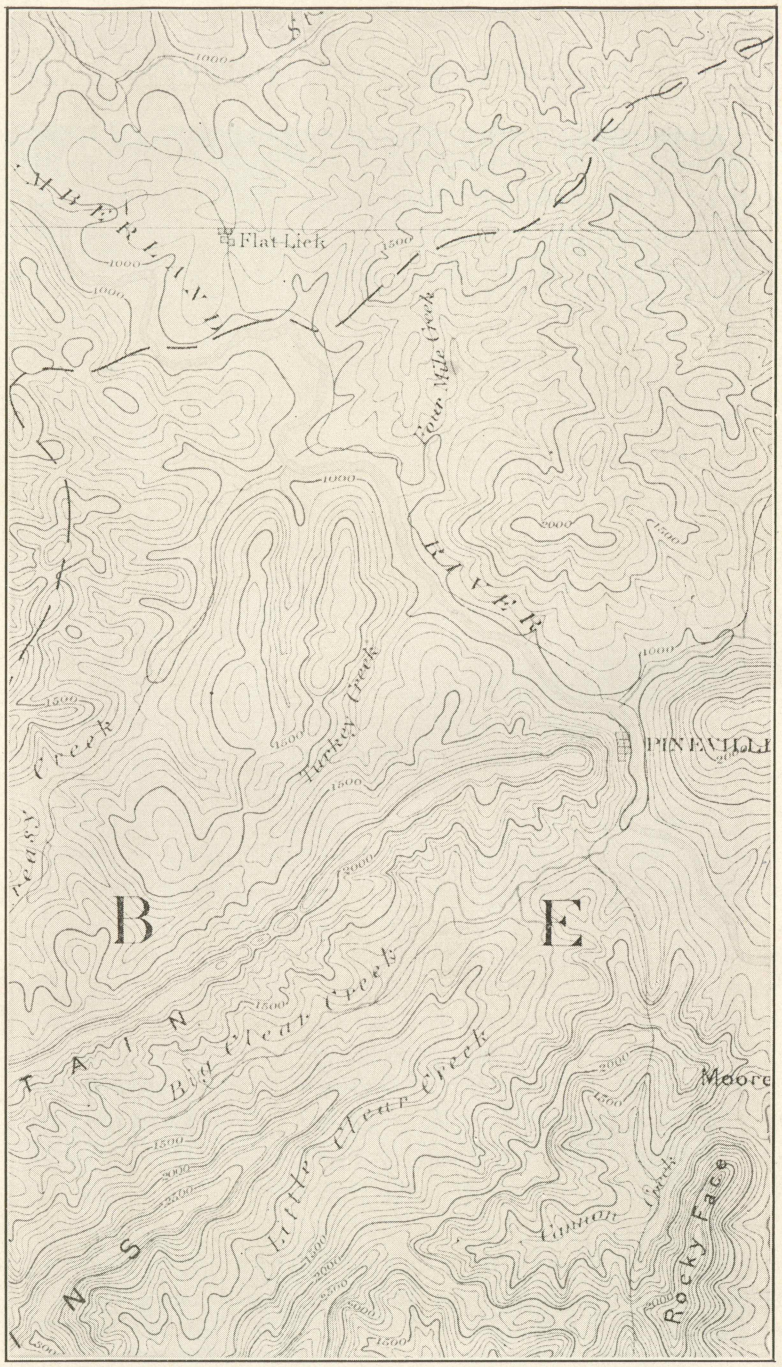


NORTHERN PORTION OF SALYERSVILLE QUADRANGLE

This old sheet covers a very important part of the Eastern Kentucky Coal Field. It should be remapped to the scale 1.62,500.

In arriving at estimates of the sum necessary to complete the base map of Kentucky, care has been taken to figure the cost of the work which has been done to the present time, as the cost of field work based on increased living and transportation costs is now much greater than it was some years ago. It has been figured that with the sum of $400,000 which will be matched by the same amount of money from the U. S. Geological Survey at Washington the topographic base map of Kentucky may be completed within a four-year period. At the present time seventy-six full and part sheets are now completed and in course of distribution, and it is computed that the unsurveyed area will produce about ninety-five full and part sheets.

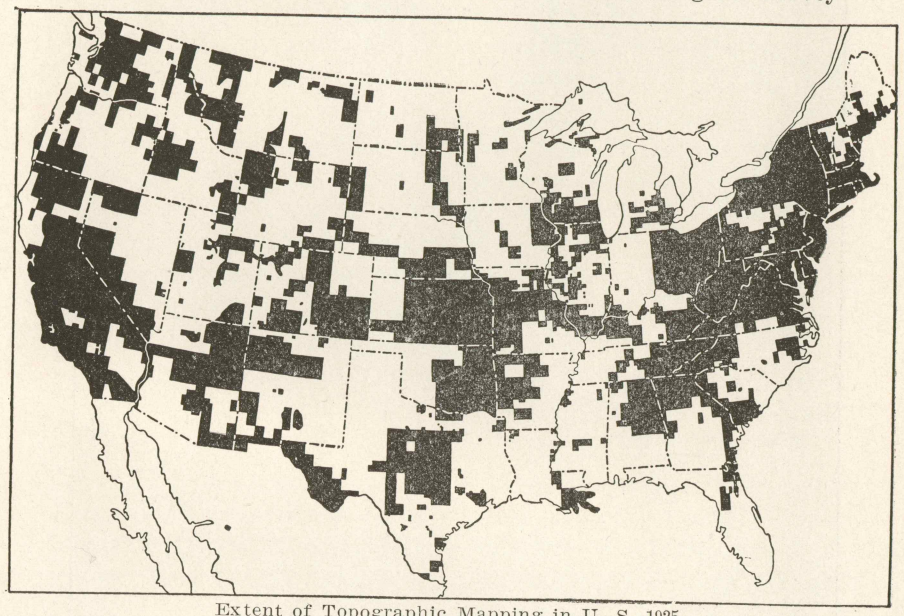
The preparation of the topographic base map is a technical engineering undertaking. With $400,000 provided by Kentucky, the work could be undertaken in co-operation between the Kentucky Geological Survey, and the U. S. Geological Survey. The latter department will furnish the men and instruments, and the Director of the Kentucky Geological Survey will indicate



TOPOGRAPHY—CUMBERLAND GAP SHEET

This quadrangle was surveyed during the period 1882–86 by the U. S. Geological Survey to the scale 1:125,000. Recent development is now shown at all. This important mineral area should be resurveyed immediately scale 1.62,500 as the present map is much out of date and too generalized for detailed use.

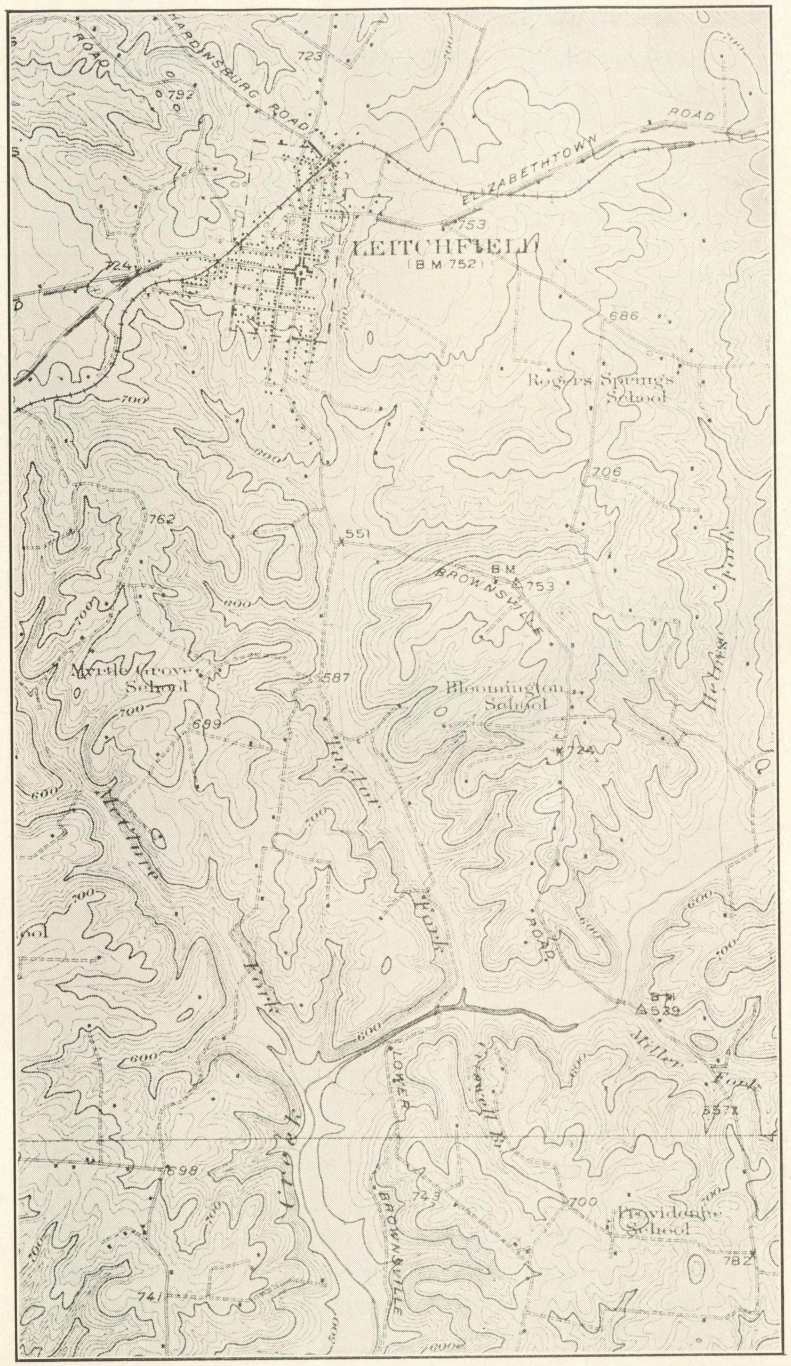
the areas to be surveyed, in order that those having the greatest economic importance and interest may be first in their completion. The field work will be executed with every dispatch, and the maps inked in and engraved by the U. S. Geological Survey



Extent of Topographic Mapping in U. S. 1925.
The Northeastern States and Kansas are almost completed mapped.

as soon thereafter as possible. In this connection it is important to call attention to the fact that no charge is made by the U. S. Geological Survey against the $400,000 for the engraving of these maps. Hence none of the funds coming from Kentucky will be used for printing. This work is done without cost to the State by the best and most modern methods in Washington, D. C.

Could $400,000 divided into four annual installments of $100,000, beginning January 1, 1926, be made available for this important work, it may be said with confidence that this State could be completely topographically mapped by January 1, 1930. With this work executed Kentucky would take its place beside the several other alert and progressive states in the Union who have executed their complete base maps. The States, now completely or more than 95 percent topographically surveyed, include Ohio, West Virginia, Pennsylvania, New York, Rhode Island,



THE NEW LEITCHFIELD QUADRANGLE

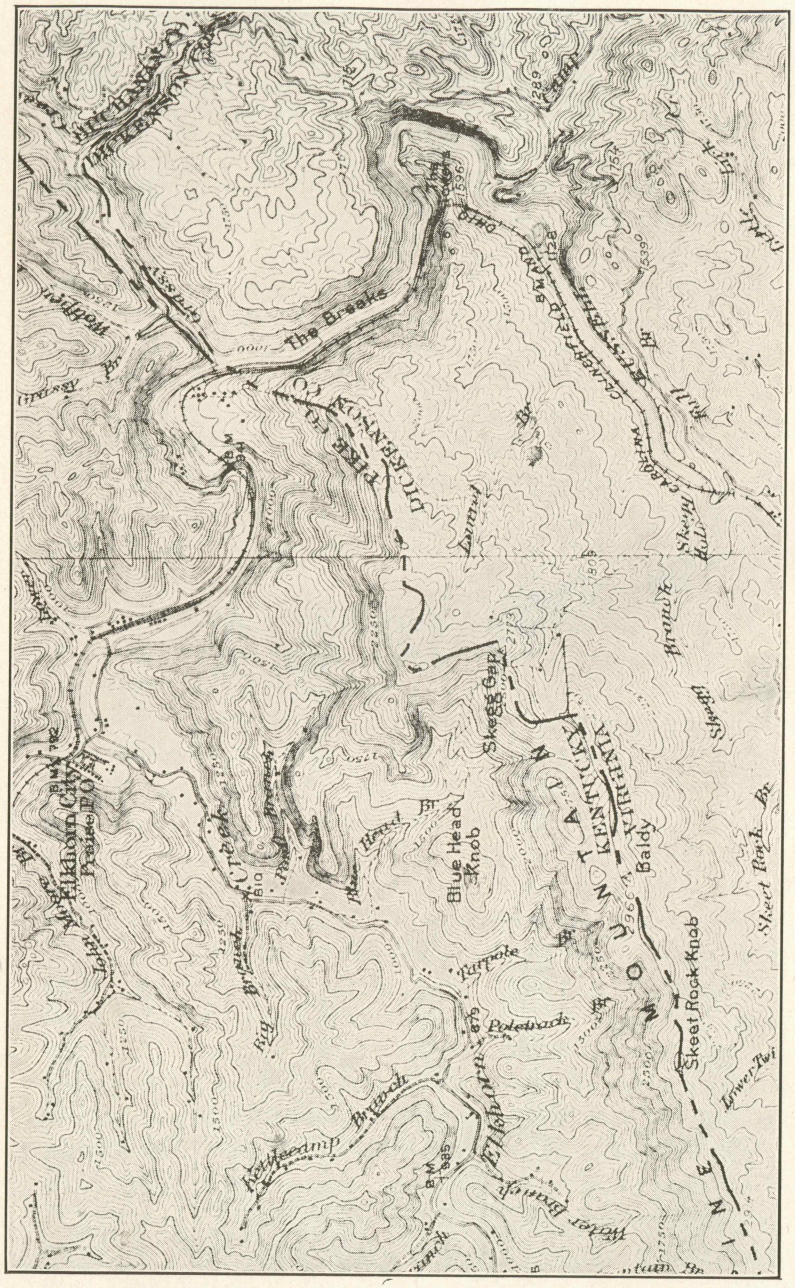
This new map covers a portion of the Rock Asphalt field of Western Kentucky. Scale 1:62,500. Northern part is here shown.

New Jersey, Delaware, Connecticut and Massachusetts. The States thus indicated comprise the industrial heart of America. As soon as Kentucky completes her base map and joins the list of progressive States, her opportunities for rapid mineral resource advancement are assured.

At the present time no adequate moneys are specifically appropriated under a special act of topographic mapping in Kentucky, and unless adequate funds are made available, it will be a generation or longer before this State will enjoy a complete and accurate base map. In the meantime the advancement of the industrial and mineral development of Kentucky will be retarded and this State unable to avoid such retardation will pay a much greater indirect tax and suffer a much greater loss than any one can accurately figure. The sum of $400,000 is ridiculously small compared to the amount of money which will be lost annually in unattained prosperity and development because of the lack of adequate base maps for this State during the next thirty to fifty years.

If these much needed base maps are prepared they will pay for themselves in an accelerated prosperity which will be state-wide, and it may be pointed out here with every assurance that at the present time the greatest localized benefits which will result in the completion of the topographic base map will be in those areas which have for many years been designated as "pauper counties." The completion of an accurate base map for these extended backward sections will assist in "putting them on their feet" and thus relieve the agricultural counties of Central, Southern, and Western Kentucky from a great, and according to the present plan, an unending burden.

Mineral development bringing the investment of large wealth, new pay rolls, and relief will in the course of a short time result in lower taxation for State purposes. The tremendous amount of moneys which will thus be saved taxpayers will stimulate new and progressive industry in Kentucky. In this sound and continuous way the original cost of these maps, and any and all interest which may accrue will be many times over repaid to the people of the Commonwealth. The beauty of the proposal is that once the maps are prepared there will be no further cost attached to them. The mapping of Kentucky is in


Elkhorn City
Pelsor P.O.
Big Creek
Big Branch
Blue Head Knob
Skeggs Gap
Rattle
Poleback
Northeadmp Branch
Water Branch
Skeet Rock Knob
Baldy
Sheet Rock Br.
Lower Tw
Sheet Br.
Skeggs Br.
Brown Br.
Lawrence
Cabin Br.
Cabin Creek
Cabin Creek Gap
Big Br.
Big Br.
Big Br.

PUBLICATIONS OF THE (SIXTH) KENTUCKY GEOLOGICAL SURVEY.

These geological reports cover the range of Kentucky's mineral resources, and also present divisions of its stratigraphy and structure. Totaling thirteen separate and distinct volumes, they comprise all of the bound works of the Kentucky Geological Survey from April 1, 1920, to date. Twelve additional manuscripts of very great economic value besides a large number of county maps have been prepared by the Survey and are now ready for the printer, but no funds are available for their publication.

XII.

Administrative Report

For The (Sixth)

KENTUCKY GEOLOGICAL SURVEY

Years 1922 and 1923

By

WILLARD ROUSE JILLSON
Director and State Geologist

GOVERNING STATUTE

The act creating and governing the (Sixth) Kentucky Geological Survey and making appropriations for same is entitled as follows:

"An Act creating the Kentucky Geological Survey, designating its chief executive officer and his duties, and providing funds for its maintenance."[1]

This act, in conjunction with the Budget Bill of 1922, provided a total of $40,500.00 for the maintenance of the prescribed activities of the the Kentucky Geological Survey. This appropriation is divided into two funds: (1) Co-operative topographic mapping fund of $17,500.00, and (2) General Geological Fund of $23,000.00. In accordance with the statute the first fund has been used in a "dollar for dollar" co-operation with the U. S. Geological Survey in an extension of the topographical base map of Kentucky. The second fund has been used for the maintenance of the Kentucky Geological Survey proper, payment of salaries, field expense, and miscellaneous charges, including printing.

PERSONNEL OF THE SURVEY

The personnel of geological assistants[1] and trained office workers employed on the (Sixth) Kentucky Geological Survey

[1] Acts of the General Assembly of the Commonwealth of Kentucky Chapter 34, p. 141. 1920.

during the past biennium is given below. Most of these assistants are classified as "temporary employees" having been engaged for the summer field season of two or three months to do a special piece of geological or mineral resource investigation:

DIRECTOR AND STATE GEOLOGIST

WILLARD ROUSE JILLSON, B S., M. S., Sc.D., D. Sc., Frankfort, Kentucky.*

ASSISTANT GEOLOGISTS

CHARLES HENRY RICHARDSON, Ph. D., Head of the Department of Geology, Syracuse University, Syracuse, New York.

STUART WELLER, PH. D., Head of the Department of Paleontology, University of Chicago, Chicago, Illinois.

LEONIDAS CHAMBERS GLENN, Ph. D., Head of the Department of Geology, Vanderbilt University, Nashville, Tennessee.

HEINRICH RIES, Ph. D., Head of the Department of Geology, Cornell University, Ithaca, New York.

ARTHUR MCQUISTON MILLER, M. A., Head of the Department of Geology, University of Kentucky, Lexington, Kentucky.

WALTER H. BUCHER, Ph.D., Acting Head of the Department of Geology, University of Cincinnati, Ohio.

CHARLES BUTTS, M. S., Geologist, U. S. Geological Survey, Washington, D. C.

WALTER GREELEY BURROUGHS, M. S., Head of the Department of Geology, Berea College, Berea, Kentucky.

LOUIS W. CURRIER, M. S., Associate Professor of Mineralogy, Syracuse University, Syracuse, New York.

JAMES S. HUDNALL, B. S., Bowling Green, Kentucky.

GEOLOGIC AIDES

BENJAMIN B. COX, B. S., Chicago, Illinois.

GEORGE W. MORRIS, A. B., University of Cincinnati, Cincinnati, Ohio.

CHARLES VERNON THIES, C. E., University of Cincinnati, Cincinnati, Ohio.

SAMUEL M. MAYFIELD, B. S., Berea College, Berea, Kentucky.

GEOGRAPHERS

DARRELL HAUG DAVIS, Ph. D., Head of the Department of Geography, University of Minnesota, Minneapolis, Minn.

K. C. MCMURRAY, Ph.D., Department of Geography, University of Michigan, Ann Arbor, Michigan.

JOHN B. LEIGHLY, A. B., University of California, Berkeley, California.

[1] During the past biennium there were only three regular or full time employees on the Kentucky Geological Survey. These have been indicated by an asterisk. All other employees are temporary, periods ranging from 3 weeks to 3 months.

CLARENCE W. NEWMAN, A. B., Department of Geology, University of Colorado, Boulder, Colorado.

CARL O. SAUER, Ph.D., Head of the Department of Geography, University of California, Berkeley, California.

VARIOUS

W. D. FUNKHOUSER, Ph.D., Head of the Department of Zoology, University of Kentucky, Lexington, Kentucky, Zoologist.

ADOLPH CARL NOE, Ph.D., Associate Professor of Botany, University of Chicago, Chicago, Illinois, Paleobotanist.

REINHARDT THIESSEN, Ph.D., U. S. Bureau of Mines, Pittsburg, Pa., Paleobotanist.

CHARLES STEVENS CROUSE, M. S., Professor of Metallurgy, University of Kentucky, Lexington, Kentucky., Oil Shale Technologist.

A. M. PETER, Sc.D., Head of the Department of Chemistry, Agricultural Experiment Station, University of Kentucky, Lexington, Kentucky, Chemist.

WARREN R. KING, C. E., U. S. Geological Survey, Division Water Resources, Chattanooga, Tennessee., Water Resource Engineer.

JOSEPH L. BISSELL, Frankfort, Kentucky, Draftsman.

F. W. BERTSCH, A. B., University of Cincinnati, Cincinnati, Ohio, Draftsman.

LAFAYETTE B. HERRING, A. B., Lexington, Kentucky, Statistician.

J. FORREST CUSICK, Frankfort, Kentucky, Photographer.

HUBERT DIXON CRIDER, University of Kentucky, Lexington, Kentucky, Engineer.

GEORGE W. PIRTLE, University of Kentucky, Lexington, Ky., Engineer.

J. M. FRASURE, Frankfort, Kentucky, Chief Clerk.*

ANN M. CRITTENDEN, Frankfort, Kentucky, Manuscript Copyist.

CATHERINE B. MCNAMARA, Frankfort, Kentucky, Stenographer and Accountant.*

SUMMARY OF ACTIVITIES

The field work of the Kentucky Geological Survey for the years 1922 and 1923 consisted of a number of detailed, and general geological and mineral resource investigations widely distributed throughout Kentucky. During this period the quadrangular work of Dr. Stuart Weller in Livingston, Caldwell and Crittenden counties on the structure and stratigraphy of the Mississippian rocks of this region has been continued. This section forms the northern portion of the well known western Kentucky fluorspar field. The reports which have been published on this section are as follows: Vol. 4, "The Geology of the Golconda Quadrangle," and Vol. 10, "The Geology of the Prince-

ton Quadrangle.'' The ''Geology of the Cave-In-Rock (Marion) Quadrangle has been executed in the field and the manuscript and map has been prepared, but the report has not been published.

During the past two years Dr. Charles H. Richardson has been engaged in quarry studies which have resulted in the publication of Vol. 11, ''The Building Stones of Kentucky.'' In this report are described 616 Kentucky quarries. Twenty-three new marbles rather widely distributed throughout the State are also indicated. This work is now available for public distribution. Dr. Richardson has also completed his work (Vol. 22) on the ''Road Materials of Kentucky,'' which was done in co-operation with the State Department of Roads and Highways and the Kentucky Geological Survey. The field work and expense was met by the Road Department, while the geological work was directed through the Kentucky Geological Survey, which organization will also publish the report which is now in the hands of the printer.

A reconnaissance report (Vol. 13) on the ''Fluorspar Deposits of Kentucky'' has been completed by Prof. L. W. Currier and published by the Geological Survey. This treats of the occurrence of fluorspar in central and western Kentucky, but is not a detailed report as topographic base maps were not available for these sections when this work was executed.

Dr. D. H. Davis has completed a regional geographic study of the Jackson Purchase which has been published. This report (Vol. 9, ''Geography of the Jackson Purchase'') has had a wide distribution and met with popular approval. It brings out the fundamental economic relationship between the geography, physiography and geology of the region discussed. The State Geologist, Dr. W. R. Jillson, has prepared a report, Vol. 12, entitled ''New Oil Pools of Kentucky.'' This bulletin describes the occurrence of recently mapped anticlines and domes at a number of points in Kentucky where oil and gas is now indexed, and indicates points where further prospecting may be expected to increase this production. He has also prepared a report (Vol. 15) entitled ''Geological Research in Kentucky,'' which is a summary consideration of all the geology that has been published by the Kentucky Geological Survey, the U. S. Geological Survey, and various technical societies relative to the geology of Kentucky. This report will soon be available and will do much toward making the older reports, many of which are now only to be found in libraries, of service to the public.

Warren R. King has prepared a report (Vol. 14) on the ''Surface Waters of Kentucky,'' which gives volume and flow readings. This report is calculated to be of great benefit in assisting in the interpretation of the value of undeveloped hydroelectric power in Kentucky. It takes up all the major drainage courses of the State. This report is now in the hands of the printer.

Dr. William D. Funkhouser has prepared a report (Vol. 16) on a part of the zoology of Kentucky which will be of much benefit to the people of the State, particularly students. It deals systematically with the ''Wild Life of Kentucky.''

Prof. Arthur M. Miller has been engaged in mapping in detail the geology of Woodford, Jessamine and Fayette counties, and has completed the work in Woodford County. This report is now in the hands of the printer. The work on the other two counties is still in progress.

Prof. Wilbur G. Burroughs has executed two timely reports, one (Vol. 19) on the '' Geography of the Knobs of Kentucky,'' and another (Vol. 24) on the ''Geography of the Western Kentucky Coal Field.'' Both of these reports are in the hands of the printer.

Dr. Walter H. Bucher has completed his detailed studies of the Jeptha Knob of Shelby county, which exhibit very interesting and unusual structural conclusions.

Dr. D. H. Davis has extended his geographic studies and has executed (Vol. 18) the ''Geography of the Mountains of Kentucky.'' This report is now in the hands of the printer. During the past summer he has completed the field work for a report (Vol. 23) on the ''Geography of the Blue Grass Region.'' The manuscript for this report has been completed and is ready for the printer.

Dr. Carl O. Sauer, with a corps of assistants, including Professors McMurry, Leighley and Newman, has been engaged during the past season in executing the field work on a report (Vol. 25) on the ''Geography of the Mississippian Plateau in Ken-

tucky." This report is now in preparation. It completes the Survey's series of six regional geographic studies in Kentucky.

A group of papers on the Oil Shales of Kentucky have been prepared by Professor Charles Stevens Crouse, Dr. Rheinhardt Thiessen, and Dr. David White. These papers are now in the hands of the printer and will be published in the near future. They add much to our technical knowledge of the Ohio (Chattanooga) oil shale in Kentucky.

The State Geologist, Dr. W. R. Jillson, has prepared a report (Vol. 20) on the "Coal Industry in Kentucky," which takes up the history of the industry, its present distribution, and its productivity. Besides a general discussion of the geology of the coals of Kentucky, this report gives for the first time a list of all the commercially important coal mines in the State.

The name of the coal that each of these 750 mines is operating is also given in this report. Dr. Jillson has also prepared a new (Jan. 1, 1923) general geological map of the State of Kentucky which is greatly improved over all previous editions. The fault pattern in so far as it is now definitely known in Kentucky is indicated on this map, as is the Eastern Kentucky Geo-Syncline. All of the oil and gas pools are indicated, together with their pipe line connections, and each of the 750 coal mines now operating in the State is located as accurately as the scale will permit. Value and volume figures for coal, oil and fluorspar from 1914 to 1922 are given on this map.

Separate from the colored geological map, the Survey has prepared and published a new edition of the base map of the State of Kentucky, scale 1 inch equals 10 miles. This map is printed in two colors, black and blue, the blue being used to designate the streams. The background of the new map is white, which will make it useful for teachers, students and others.

In the course of investigations carried on during the past two years all of the counties in Kentucky have been covered in one or more respects. Most of the counties appear in all of the reports either directly or indirectly. Detailed geological investigations, however, have necessarily had to be confined to areas which had been previously topographically base mapped, as no other accurate base map exists on which accurate elevations are to be found.

The Kentucky Geological Survey under the personal direction of the State Geologist has prepared a series of eighteen (18) new reconnaissance black and white geographical county maps, most of them for counties which have never before been mapped. The scale in most instances is 1 inch equals 1 mile. These maps are road and stream maps and do not carry elevations, and are not suitable for detailed geological work, but are suitable for, and much in demand by tourists, farmers, road engineers, sanitary engineers, contractors and many others. Counties so mapped were: Boone, Kenton, Campbell, Bracken, Pendleton, Harrison, Grant, Anderson, Gallatin, Carroll, Owen, Franklin, Livingston, Lyon, Scott and Bourbon. The maps of Franklin and Anderson are now in the hands of the printer. Three (3) new oil and gas maps have been prepared for Cumberland, Monroe and Metcalfe counties in southern Kentucky, scale 1 inch equals 1 mile. These counties had never been previously surveyed. The detailed geology for Webster County and Woodford County has also been done, the first by Dr. Glenn and the second by Professor Miller. The Webster County map has been published and is available for distribution; the Woodford County map, however, is still in the hands of the draftsman as is a new map of McLean County.

The detailed oil and gas structural geology has been prepared by county units for six (6) eastern Kentucky counties during the past several years. These counties are: Floyd, Martin, Pike, Perry, Leslie and Boyd. Field work is now in progress in Lawrence County, which will complete the Big Sandy Valley. This work has been executed by James S. Hudnall, under the personal direction of the State Geologist. The Perry, Leslie and Boyd County maps are now in the hands of the printer. All of these maps are scaled 1 inch to the mile, and are much in demand. The completion of the Lawrence County map in the near future will give twenty-eight new county maps for the public use. These have all been prepared during the last two years by the survey.

TOPOGRAPHIC BASE MAPPING

During the years 1922 and 1923 co-operative topographic base mapping executed by the Kentucky Geological Survey and

the U. S. Geological Survey in a "dollar for dollar" co-operation has been extended, and $17,500.00 as appropriated by the legislature, has been devoted to this purpose by Kentucky. The Director of the Kentucky Geological Survey has designated the areas to be mapped, and the Director of the U. S. Geological Survey has supplied the men and the instruments, the maps being prepared and engraved by the U. S. Geological Survey. As a result of this co-operative agreement the following sheets have been completed: (1) Bowling Green, (2) Brownsville, (3) Frankfort and (4) Mammoth Cave. Field work has been extended to complete the Cub Run, Leitchfield and Horse Branch sheets. The Scottsville and the Mt. Eden topographic sheets are 50% and 75% completed, respectively.

At the present time, of the 40,598 square miles in Kentucky 19,898 square miles are base mapped topographically, and 20,705 square miles remain to be mapped. It is very urgent that this unmapped area be base mapped as soon as possible, as this unmapped area is responsible for holding back the development of a large part of the mineral resources of Kentucky. The States which have completed their topographic base maps are: Ohio, West Virginia, Maryland, Delaware, New Jersey, New York, Connecticut, Rhode Island and Massachusetts. Pennsylvania is about 95% base mapped, and Virginia about 80% base mapped. Kentucky will continue to trail behind her sister states in the development of her mineral resources until this State like other advanced and progressive states of the Appalachian district is entirely topographicaly base mapped. In its annual session at New Orleans, December 3-6, 1923, the American Association of State Highway officials recommended by detailed resolution which has been forwarded to your office the rapid completion of the Topographic base map. This mapping has also been recommended by the Kentucky Department of State Roads and Highways in their last official report to your excellency and the Legislature. It is of prime importance to the development of Kentucky.

OFFICE WORK

The office work of the Kentucky Geological Survey has been carried on during the past biennium by three regular or full-time

employees, including the State Geologist, and has totaled 15,600 letters received, and 14,563 sent out. The average number of letters received per day has been 27, and the average number sent out per day has been 25. A detailed statement by months is given in the following table:

CORRESPONDENCE THROUGH THE U. S. POST OFFICE AT FRANKFORT, KY., FOR THE TWO FISCAL YEARS

JULY 1, 1921 TO JUNE 30, 1923, INCLUSIVE

Year	Month	Letters Received	Letters Sent
1921	July	586	566
1921	August	594	662
1921	September	676	636
1921	October	750	785
1921	November	680	616
1921	December	699	626
1922	January	640	601
1922	February	721	673
1922	March	825	736
1922	April	522	468
1922	May	677	562
1922	June	602	560
Total July 1, 1921 to June 30, 1922, inclusive		7,972	7,491
1922	July	705	542
1922	August	671	625
1922	September	566	545
1922	October	649	589
1922	November	552	530
1922	December	612	597
1923	January	625	596
1923	February	596	548
1923	March	759	713
1923	April	684	622
1923	May	694	667
1923	June	515	498
Total July 1, 1922 to June 30, 1923, inclusive		7,628	7,072
Grand Total for the two years ending June 30, 1923		15,600	14,563
Daily Average		27	25

The smaller number of letters written and sent out is accounted for by the fact that a considerable portion of the corres-

pondence calls for certain reports and maps and does not require other official reply.

One of the chief activities of the Kentucky Geological Survey is the furnishing of detailed and accurate geological and scientific information concerning the geology, mineral and natural resources of Kentucky. In this State and international service during the past biennial period 17,427 geological reports and maps have been sent from this office in response to written or personal requests accompanied by separate amounts of postage as required by law as shown by the following statement:

KENTUCKY GEOLOGICAL SURVEY PUBLICATIONS DISTRIBUTED UPON REQUEST

FIRST FISCAL YEAR, 1921-1922

Year Mo.	Number Mailed	Number Carried Away	Total
1921—July	638	59	747
1921—August	632	120	752
1921—September	532	60	592
1921—October	764	95	859
1921—November	488	147	635
1921—December	284	86	370
1922—January	835	26	861
1922—February	823	250	1,073
1922—March	905	91	996
1922—April	482	75	557
1922—May	859	67	926
1922—June	563	186	749
Total for Fiscal Year Ending 1921-1922			9,117
1922—July	452	67	519
1922—August	417	140	557
1922—September	495	86	581
1922—October	459	167	626
1922—November	596	40	636
1922—December	697	300	997

Year Mo.	Number Mailed	Carried Away	Total
1923—January	903	89	992
1923—February	398	94	492
1923—March	702	174	876
1923—April	741	77	818
1923—May	454	146	600
1923—June	428	188	616
Total for Fiscal Year 1922-1923			8,310
Grand total for two Fiscal Years 1921-1922 and 1922-1923			17,427
Daily Average			30

The reports and maps distributed as indicated above pertain to every subject relative to the geology, soils and mineral resources of Kentucky. These publications have been sent, not only to every place in Kentucky, but throughout the United States; also Canada, Mexico, England, France, Germany, Japan and China. Requests for publications of the Kentucky Geological Survey through foreign libraries, industrial corporations and institutions is a growing one. The total amount of postage received in this service was re-used directly during the past biennium and has amounted to $1,876.54. Since this amount of postage thus obtained is in effect a revolving unit being used as quickly as it is taken in, amounts in excess of a few dollars are never maintained in the office of the Survey. Of all the considerable amount of business which has proceeded through the U. S. post office for first-class correspondence and second-class mail or publications, not one penny has been drawn from the treasury of the State of Kentucky. In this respect the Kentucky Geological Survey is entirely self-supporting. The monthly and annual totals of postage received by the Kentucky Geological Survey follows:

FIRST FISCAL YEAR, 1921-1922

July	$70.68
August	49.50
September	69.75
October	54.30
November	51.60
December	25.00

January	$49.00	
February	85.00	
March	53.00	
April	59.00	
May	78.00	
June	123.00	
Total	$767.83	$767.83

SECOND FISCAL YEAR, 1922-1923

July	$50.50	
August	63.00	
September	41.00	
October	63.00	
November	43.00	
December	73.00	
January	48.50	
February	57.10	
March	68.00	
April	49.35	
May	38.00	
June	33.00	
Total	$627.45	627.45

Grand total used in mailing parcel post packages	1,395.28
Letters mailed first fiscal year, 7,491, at 2c	149.82
Letters mailed second fiscal year, 7,072 2c	141.44
Approximate amount of postage used in this office for registered letters and manuscripts during the two years	190.00
Total postage used during the two fiscal years, 1921-1922 and 1922-1923	$1,876.54

NEW PUBLICATIONS

The following publications have been prepared in 1922 and 1923:

Vol. *7.—Series VI, Mississippian Series in Eastern Kentucky, by Charles Butts. 1922.

Vol. 8.—Clay Deposits of Kentucky, by H. Ries. 1922.

*Volumes No. 1 to 6 inclusive, were published by the Kentucky Geological Survey during 1920 and 1921, and are listed and discussed in the administrative report for that period.

Vol. 9.—Geography of the Jackson Purchase, by D. H. Davis. 1923.

Vol. 10.—Geology of Princeton Quadrangle, by Stuart Weller and others. 1923.

Vol. 11.—Building Stones of Kentucky, by Chas. H. Richardson. 1923.

Vol. 12.—New Oil Pools of Kentucky, by W. R. Jillson. 1923. (In press.)

Vol. 13.—Fluorspar Deposits of Kentucky, by L. W. Currier. 1923.

Vol. 14.—Surface Waters of Kentucky, by W. R. King. 1923. (In press.)

Vol. 15.—Geological Research in Kentucky, by W. R. Jillson. 1923.

Vol. 16.—Wild Life in Kentucky, by W. D. Funkhouser. 1923. (In press.)

Vol. 17.—Mineral Resources of Kentucky, by W. R. Jillson. 1923. (In press.)

Vol. 18.—Geography of the Mountains of Kentucky, by D. H. Davis. 1923. (In press.)

Vol. 19.—Geography of the Kentucky Knobs, by W. G. Burroughs. 1923. (In press.)

Vol. 20.—Coal Industry in Kentucky, by W. R. Jillson. 1923. (In press.)

Vol. 21.—Oil Shale of Kentucky, R. Thiessen, D. White and S. C. Crouse. 1924. (In press.)

Vol. 22.—Road Materials of Kentucky, by Chas. H. Richardson. 1924. (In press.)

RECOMMENDATIONS TO THE GOVERNOR AND LEGISLATURE

The general investigations of the Kentucky Geological Survey during the past five years have resulted in an examination of most of the commercially important mineral resources of Kentucky. Where good topographic base maps have been available detailed work has been done in so far as funds would allow it. The reports and maps which have been prepared have been eagerly sought by mineral operators and others as the Kentucky Geological Survey is the only reliable source of information rel-

ative to the mineral resources and small unit maps of this State.

On July 1, 1923, a little more than one-half of the State of Kentucky remained unmapped with a topographic base. This unmapped area comprised 20,706 square miles as computed by the U. S. Geological Survey. The mapped area at this time comprised 19,893 square miles, giving a total of 40,598 square miles, or the total area of Kentucky.

The time has come when, if Kentucky is ever to secure a large development of its mineral and natural resources, detailed geological investigations must take the place of general reconnaissance work. In a list of about 35 minerals which occur in Kentucky, the following 13 are now of paramount economic importance, and should receive detailed consideration: Asphalt, Fluorspar, Fire Clays, Natural Gas, Bituminous Coals, Cement Materials, Barite, Petroleum, Marbles, Mineral Waters, Oil Shale, Molding Sands, Mineral Paints and Ochres. These resources can not be mapped in detail at the present time, or in the future, until topographic base maps (approximately 18x14 miles) are executed for the regions in which they occur. The flint fire clay deposits of northeastern Kentucky in Carter, Rowan, Elliott, Boyd, Greenup, Morgan and Lewis counties are among the best and largest in the United States. The cannel coals of eastern Kentucky, and particularly northeastern Kentucky in Morgan, Johnson, Magoffin, Floyd, Elliott and Rowan counties are the best in the United States, yet they have never been described in detail. These wonderful coals are deserving of careful geological investigation and mapping.

Asphalt occurs in Hart, Edmonson, Warren, Hardin, Grayson, Breckinridge, Hancock, Ohio, Logan, Butler and Muhlenberg counties in western Kentucky, and in Carter, Rowan, Elliott, Johnson and Letcher counties in eastern Kentucky. These deposits of rock asphalt, particularly those of western Kentucky, are far superior quantitatively and qualitatively to any other deposits in the eastern United States. No detailed report on rock asphalt is available, but one should be prepared in order that this great latent body of mineral resource wealth may be developed. Detailed reports are also needed on Bituminous Coals, Fluorspar, Barite, Petroleum, Natural Gas, Marbles, Mineral Waters, Cement Materials, Oil Shales, Mineral Paints, Molding Sands, etc., of Kentucky.

During the past four years the funds provided for the Kentucky Geological Survey have been inadequate to meet the needs of the Survey and the demands imposed upon it by the general public. Funds have been so low as to make it impossible to maintain an Assistant Geologist of ability on the Survey throughout the year. From year to year an increasingly large amount of manuscript reports and mineral resource maps have remained unprinted due to lack of funds with which to publish them.

The total number of bound printed reports now in stock is 7,318, as compared to 10,612 in stock at the end of the last biennium. Although 5,500 new reports have been added there is a loss of 3,294 for the past two years At this rate of decrease even with the new reports that will be added, there will be no printed reports for distribution to the general public in a little over four years. The only remedy for this alarming condition is an increase in the size of new editions. This cannot be done with the present small appropriations.

In the spring of 1922 and 1923 insufficient amounts in the geological fund were left in the State Treasury to meet the pay roll of the three regular employees of the Survey. This difficulty was obviated in one case by selling an old automobile, and in another instance by putting the entire geological survey to work for the Tax Commission. Such practices are not only discouraging to the best efforts of the Survey but are a real obstruction to satisfactory service to the State and general public. The Survey cannot longer be maintained and function to advantage on the small general appropriation of $23,000.00. Many of the reports which are most in demand have been exhausted in edition, and not only is there no money in sight with which to print new editions of these valuable works, but there are no funds to bring out a large number of entirely new manuscripts which are ready for the printer.

The wealth of the State is found in the active development of its agriculture, its mineral resources and its manufacturing. The state which depends to a large extent upon any one of these orders of industry will be much poorer than one which is supported by two or three. Kentucky has long stood back, main-

tained almost entirely by its agriculture. Its mineral resources and industrial development have lagged. Coal, oil and gas have only begun during the last few years to be developed. It is thoroughly possible following a completment of the topographic base mapping of Kentucky and detailed geological investigations to bring out the resources of this State and give them the needed publicity. This will certainly result in the large flow of capital into Kentucky for development.

The production of minerals in this State and the re-use of Kentucky minerals in Kentucky for manufacturing purposes could be made very great. With such development will necessarily come large ad valorem assessments and an increase of tax moneys into both the State and county treasuries. The establishment of many new large pay rolls throughout particularly the "pauper" sections of Kentucky where undeveloped mineral resources are now known to occur will result in increased prosperity for these sections. This new industrialism will result in keeping Kentucky's manhood and womanhood in Kentucky rather than allowing it to drift out of the State from year to year, as it has always done in the past. The population of this State has remained practically stationary when compared with that of other states for several decades. Kentucky's area is nearly the same as that of the state of Ohio. Yet its population according to the last U. S. census is but about one-half of that of our northern sister state. The reason for this sad condition of affairs is found in the lack of interest in mineral resources and industrial development in Kentucky.

To enable the Kentucky Geological Survey to base map the State, detail its resources, and thus advance development, the following appropriations are recommended:

1. Annual apropriation of $100,000.00 for co-operative topographic base mapping.
2. Annual appropriation of $50,000.00 for the general purposes of the Kentucky Geological Survey, including geological investigations of resources, office administration, printing, etc.

This total appropriation of $150,000.00 should be secured through the budget bill. There should also be appropriated through a separate bill in the present legislature an emergency appropriation of $17,000.00, so that a large number of the re-

source reports and maps which are now in the hands of the printer may be published and paid for forthwith, and thus be made available for the general public. This money will also allow road material investigations which are now much needed and should precede large road construction in Kentucky rather than follow it if the maximum mileage is to be secured at a minimum cost to the Department of State Roads and Highways. This work has been recommended by the Efficiency Commission in its recent report to the Legislature. If such an emergency appropriation is not appropriated, these reports, some of which have been in the hands of the printer for some time, will become old, and to a certain degree out of date before they can be presented to the public.

AVAILABLE MAPS AND REPORTS

There are now ready and available for immediate distribution through the Kentucky Geological Survey to any interested individual, corporation, company or institution requesting same a large number of special reports and maps, prepared by this and previous Surveys. These publications cover the general geology and development of many of the mineral resources of Kentucky. The early reports of the 1st and 2nd Geological Surveys are now entirely exhausted, with but a few exceptions. The publications of subsequent surveys, including the present or (Sixth) Kentucky Geological Survey, which are now available are listed in chronological sequence by titles and authors. The required postal charge and the number which are still available is indicated. The number of reports now in stock is 7,318. The total number of maps is 25,835. The total of maps and reports now available for distribution is 33,153. A request for any of these publications addressed to the Director, when accompanied by the required amount of postage (checks or money orders may be used) will be promptly filled until the edition is exhausted. The list given is essentially a duplicate of the one used in the official correspondence of the Kentucky Geological Survey.

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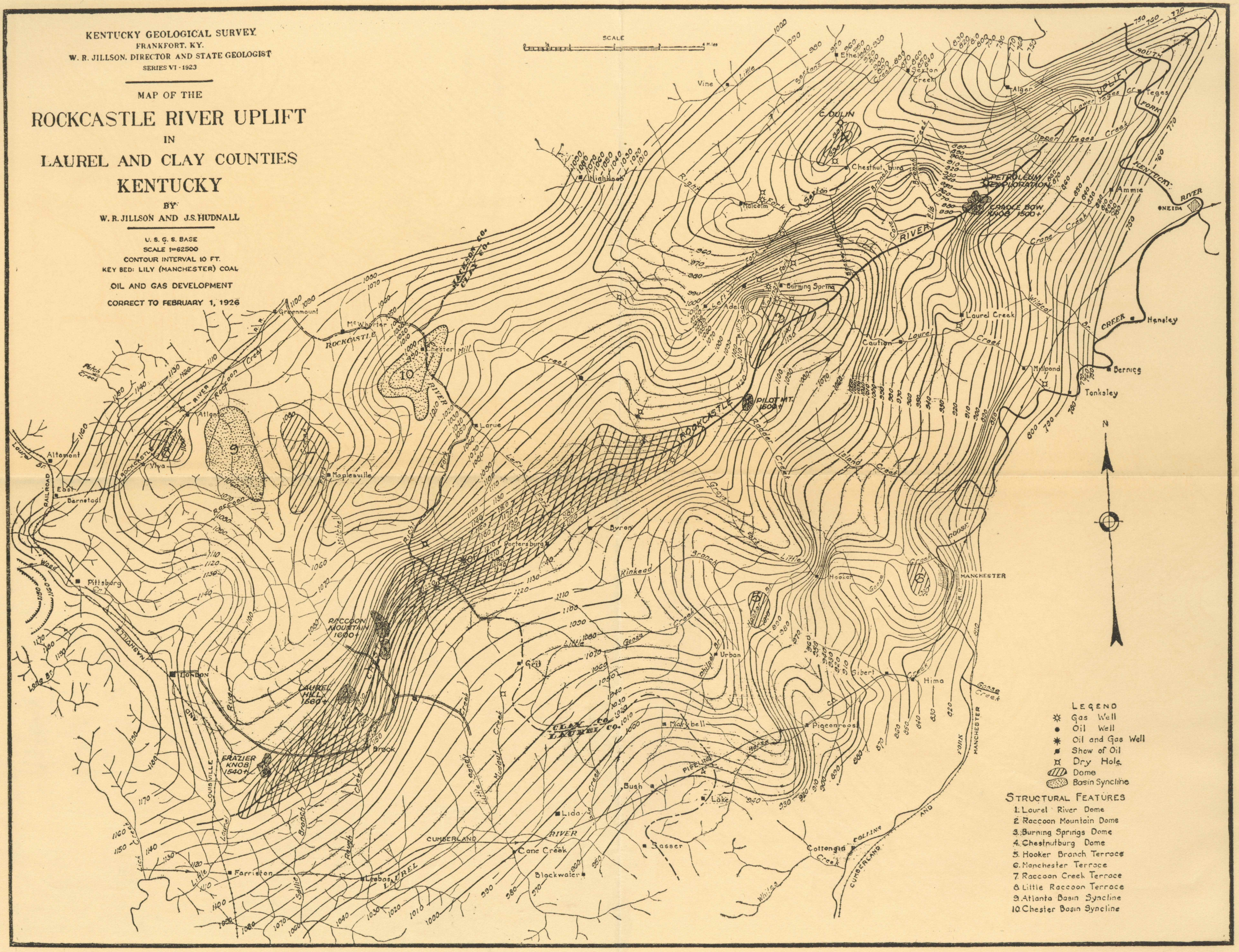
KENTUCKY GEOLOGICAL SURVEY
FRANKFORT, KY.
W. R. JILLSON, DIRECTOR AND STATE GEOLOGIST
SERIES VI - 1923

MAP OF THE

ROCKCASTLE RIVER UPLIFT
IN
LAUREL AND CLAY COUNTIES
KENTUCKY

BY
W. R. JILLSON AND J. S. HUDNALL

U. S. G. S. BASE
SCALE 1=62500
CONTOUR INTERVAL 10 FT.
KEY BED: LILY (MANCHESTER) COAL

OIL AND GAS DEVELOPMENT

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